M/N POM 7-166A-F
S/N 47-2822

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INSTRUCTION No.IT-182

CLASS "A" BATCH OVENS WITH TOUCHMASTER CONTROL

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CAUTION!

TO AVOID DAMAGE, THIS INSTALLATION ADJUSTMENT INSTRUCTION MUST BE FOLLOWED CAREFULLY.

INSTALLATION ADJUSTMENT

This unit is designed to operate from a wide range of power input voltages. To provide optimum internal control circuit operation, the secondary of the control circuit transformer (located on tray behind control panel) is provided with several adjustable taps and a double wound primary coil. Installing electrician must verify that this transformer has been connected for your actual power input voltage.

The transformer primary (Terminals H1, H2, H3 and H4) are connected for either 208-240 volts or 380-480 volts. These connections should not be changed as correction of such magnitude would also require power component replacement (heaters, motors, fuses and even wiring).

The transformer secondary (terminals X1, X0, X2 and X3) can and should be adjusted to provide a control operating voltage of 110 to 120 volts on 60 hertz units or 100 to 110 volts on 50 hertz units. Transformer terminal X1 is grounded to act as control circuit neutral and should not be changed, but wire connected to terminal X0, X2, or X3 can be moved to provide the control voltage closest to that listed above. Table on wiring diagram shows usual voltage connection, but it is recommended that an actual measurement of control circuit voltage be made at time of installation and tap adjustments be made to bring control voltage to above optimum value.

NOTE: NOT ALL TRANSFORMERS INCLUDE THE X0 TAP.

NOTICE - CAUTION

BLUE-M BELIEVES THIS INFORMATION IS CORRECT FOR YOUR EQUIPMENT AS IT WAS ORIGINALLY SUPPLIED BY US. SAFETY REQUIREMENTS ARE CHANGING CONTINOUSLY, YOUR EQUIPMENT MAY NO LONGER MEET CURRENT SAFETY REQUIREMENTS. BLUE-M CANNOT BE RESPONSIBLE FOR CHANGES MADE BY YOU, OTHER USERS OR OWNERS.

WS/AA/LV: 5/16/86

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HAZARD

THIS UNIT IS NOT INTENDED FOR USE IN PROCESSING HAZARDOUS WORK LOADS. FATAL INJURIES AND PROPERTY DAMAGE CAN RESULT FROM PROCESSING COMBUSTIBLE VOLATILE FLUIDS OR MATERIALS WHICH EMIT EXPLOSIVE VAPORS.

Consult with your safety engineering staff before processing questionable loads in this unit.

Blue M designs and manufactures other equipment for processing hazardous materials.

CAUTION FOR UNITS WITH OTP ONLY!

If this unit is equipped with OTP, overtemperature protection circuitry, then unit must be checked once a month to ensure it is performing according to design parameters.

TO TEST: Run operating temperature of chamber without a product load to a value above the OTP trip point, usually a value ten degrees above unit's normal maximum operating temperature. Lowering trip point to the temperature setpoint to create an alarm condition is NOT a valid test.

When plenum temperature reaches the OTP setpoint, chamber should shut down and cease operating if the OTP circuit is functioning properly.

After testing, chamber can be returned to normal operation by pressing the OTP reset button.

Refer to your unit's OPERATING AND MAINTENANCE Instruction for detailed information.

DANGER!

TO ENSURE PROPER OPERATION OF UNIT AND FOR SAFETY, MAKE SURE THAT UNIT IS LEVEL WHEN INSTALLED. DOOR(S) MAY SWING SHUT ON PERSONNEL IF UNIT IS TILTED!

THIS PRODUCT IS BUILT WITH DESIGNED-IN SAFETY FEATURES. ANY UNAUTHORIZED MODIFICATIONS OR COMPONENT CHANGES TO THIS UNIT COULD RESULT IN CONDITIONS LEADING TO PERSONAL INJURIES, PROPERTY DAMAGE, AND FATALITIES!

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BLUE M ELECTRIC
A GENERAL SIGNAL COMPANY

REPLACEMENT INSTRUCTION NOTICE

This operating manual, wiring diagram and parts list is being supplied by Blue M / A unit of General Signal. We believe this information to be the same as supplied with equipment when it was shipped by us.

A. There may be some Instrumentation Manuals missing for obsolete or special instruments used on this equipment. Blue M no longer has these manuals and you should obtain them from the Instrument Manufacturers.

B. The part numbers shown on the parts list may still be current or they may have been changed to our new parts numbering system. Parts ordered with the old numbers will be converted to the new numbers when your order is received. We cannot guarantee that all parts are available for all units. Substitutes will be supplied when these are available.

C. BLUE M CANNOT BE RESPONSIBLE FOR ANY MODIFICATIONS OR CHANGES MADE BY YOU OR OTHERS USING THIS EQUIPMENT.

D. If you should have any questions or doubts as to the operation or suitability of this or any other Blue M unit to perform a specific application, we suggest you contact your nearest Blue M Office for an inspection call.

E. Blue M equipment is designed and manufactured to the safety standards required for the particular piece of equipment as they applied to the equipment at the time it was manufactured. These standards have changed over the years and it is quite possible that the equipment you have will no longer meet these standards.

WS/RH: 12/8/88

* * * * * IMPORTANT WARNING! * * * * *

DO NOT MODIFY OR CHANGE ANY COMPONENT OF THE SYSTEM. PARTS REPLACED MUST BE O.E.M. EXACT REPLACEMENT EQUIPMENT. MODIFICATION OR USE OF THE EQUIPMENT OTHER THAN IN A MANNER EXPRESSLY INTENDED IS DANGEROUS. THIS INCLUDES THE USE OF USER SUPPLIED COMPONENTS AND MATERIALS SUCH AS REFRIGERANTS WHICH THE UNIT WAS NOT SPECIFICALLY DESIGNED TO UTILIZE. THIS ALSO INCLUDES, IN EQUIPMENT USING SUCH DEVICES, RECONFIGURATION OF THE CONTROLLER WHICH COULD CHANGE THE UNIT CHARACTERISTICS AND DESIGN PARAMETERS, AT BEST HAMPERING PERFORMANCE, AND AT WORST CREATING A DEADLY PIECE OF EQUIPMENT.

BLUE M SHALL NOT BE LIABLE FOR ANY DAMAGES, INCLUDING INCIDENTAL AND/OR CONSEQUENTIAL DAMAGES, REGARDLESS OF THE LEGAL THEORY ASSERTED, INCLUDING NEGLIGENCE AND/OR STRICT LIABILITY.

BEFORE USING, USER SHALL DETERMINE THE SUITABILITY AND INTEGRITY OF THE PRODUCT FOR INTENDED USE AND THAT UNIT HAS NOT BEEN ALTERED IN ANY WAY. USER ASSUMES ALL RISK AND LIABILITY WHATSOEVER THEREWITH.

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RH: 3/17/87

MAINTENANCE AND OPERATING INSTRUCTIONS FOR BLUE M INDUSTRIAL CLASS "A" BATCH OVENS WITH TOUCHMASTER CONTROL SYSTEM

INSTALLATION

A. UNCRATING

Carefully uncrate oven and all accessories. Visually inspect for any signs of damage from improper handling. Report all claims for damage to the carrier immediately. We will assist you with your claim, if requested. Please do not return goods without written authorization.

B. LOCATION

This oven will maintain temperatures within its range to close tolerances for extended periods without adjustment. Producing results compatible with this oven's capabilities requires reasonable care in choice of location.

Line voltage variations should be kept to a minimum for best control accuracy. Do not locate oven in areas of wide ambient temperature variation. While this over will perform satisfactorily under less than ideal conditions, optimum control characteristics will be obtained if these variables are kept to a minimum.

C. POWER CONNECTION

Unit is furnished with a fused disconnect. Necessary information for sizing power lines and fusing appears on the unit's data plate and the wiring diagram/parts list. Fuse protection must never exceed 125% of the oven's current rating.

CHAMBER MUST BE GROUNDED. This piece of equipment must be properly grounded before it is used. Consult the National Electrical Code and local codes for proper grounds.

D. BLOWER ROTATION

Oven must be checked for proper blower rotation before use. Rotation is correct when a rapid movement of air can be felt from the right side of the chamber interior. Reversing any two of the incoming power lines will reverse blower rotation. Check air flow both ways to determine which produces the greatest air flow.

NOTE: This oven's heating elements will not energize if blower rotation is incorrect. As a safety feature, an air flow switch has been installed in the blower plenum of the oven. The pressure switch is used to sense the pressure differential created by the blower. If air flow is not great enough, the elements will not energize. Incorrect blower rotation will cause this situation.

OPERATING CONTROLS AND FEATURES

TOUCHMASTER is a unique Blue M control system which was developed to provide a convenient and consistent method of entering thermal set point data for often repeated tests.

TOUCHMASTER allows the setting and calibration of any four selected temperatures within the thermal range of the unit by means of individual multiturn potentiometers (pots). A four position push button switch allows the operator to select any one of the four preselected set points quickly and accurately.

The push button control selected will cause the chamber to repeat the selected temperature constantly; thus eliminating hysterisis factors found in manually set systems.

Also, there are four additional pots which serve as a handy reference (memory) to the values selected on the main temperature control pots. Each time the control pots changed, the corresponding memory pots should be changed accordingly. Failure to maintain "synch" between the pots could result in the destruction of the chamber work load.

Besides the four main temperature settings, TOUCHMASTER also features a singleturn pot connected to a calibrated thumb wheel set point device. This feature allows the operator to select other temperatures with out disturbing the preset ones. If left in one position, the thumb wheel also serves as a fifth constant temperature set point.

The unit is fully fused, and is available for either single or 3-phase operation.

DESCRIPTION OF CONTROLS

This section is provided to acquaint the operator with the components used in the TOUCHMASTER Control System. See Fig. 1 for component locations. All item references are to Fig. 1.

A. SET POINT SELECTOR SWITCHES (Item A)

These are four interlocking push button switches. When depressed, each switch's contacts connect the corresponding set point control pot with the temperature controller. The respective set point control pot for that particular switch is also brought into the circuit.

B. CONTROL SET POINT POTS (Item B)

Four multi-turn pots supply set point information to the temperature controller. On units with a temperature range limit of +343C (POM 70), two low temperature and two high temperature pots are used. The low temperature pots can be set for any set point value from the unit's low end to +250C; the high temperature pots can be set for any desired temperature from +150C to the unit's upper limit. This design is used to overcome the effects of extreme non-linearity present in thermistor temperature sensors.

On units with a range limit of +704C (POM 80), the entire temperature range of the unit may be selected by all four pots. Control set point pots are generally shipped set at a nominal minimum value; if factory calibration at any specified temperatures is required, set point switches will be set for these temperatures. Setting of control set point and indicator control set point pots is CW to increase, and CCW to decrease the temperature setting.

C. INDICATOR SET POINT POTS (Item C)

Each of these pots can be set to provide an analog record which corresponds to each set point selector switch setting. Values stored on the indicator set point pots are displayed when the PUSH TO READ button is depressed. Indicator set point pots serve only as reminders of set point settings; they have no control function.

D. PUSH TO READ SWITCH (Item D)

When depressed at the same time as any set point selector switch, causes indicator to display the value of the corresponding indicator set point pot.

E. THUMB WHEEL MANUAL SET POINT CONTROL (Item E)

By partially depressing one of the set point selector switches, all of the selector switches will move to the "out" position. This causes the thumb wheel to assume control of the chamber temperature.

F. DIBITAL PYROMETER/INDICATOR (Item F)

This is a 3-1/2 digit instrument to indicate chamber temperature, and display stored set point values. Stored set point values are displayed using the PUSH TO READ switch. Actual chamber temperature is displayed otherwise.

G. VOLT METER (Item G)

Indicates percentage of available voltage applied to the heating elements by the temperature controller.

H. MAIN PILOT LAMP (Item H)

Lights to indicate that power is applied to the control circuit.

I. CONTROL CIRCUIT FUSE (Item I)

Protects 120-VAC control circuit from damage due to excessive current.

J. CONTROL FAILURE SIGNAL LAMP (ITEM J)

Indicates that chamber is in an over-temperature condition and the OTP circuitry has shut the unit down completely. Lamp will go out when the OTP RESET switch is depressed.

K. OTP RESET SWITCH (Not shown)

This switch is mounted on the OTP Control. See paragraph N.

L. MAIN POWER SWITCH (Item L)

Provides control of oven circuit power.

M. PHASE SELECTOR SWITCH — 3-PHASE UNITS ONLY (Item M)

Three position rotary switch that allows volt meter to indicate the percentage of available phase voltage applied to each heating element. This switch serves to confirm operation of master and slave boards. Use of switch is essential to balance the three phases in the event of circuit board replacements.

N. OTP CONTROL (Not shown; located to left of unit)

FM-approved high limit protection circuitry to prevent damage to work load and chamber in the event of an over temperature condition. Unit will shut down completely in event of an over temperature condition.

If chamber temperature rises above the OTP set point, the OTP control will trip and shut the unit down. As unit shuts down, an alarm will sound to alert the operator of an over temperature condition. This is signalled when the Control Failure Signal Lamp lights. Unit will cool to below OTP set point and then can be restarted by pressing the red RESET button located on the OTP Control.

Normally, the OTP set point is adjusted to a value 10C above the main control temperature setting. To adjust the OTP control set point, rotate the outer ring of the OTP Control and line up the pointer with the desired set point temperature (See Mfr's instructions for further details).

NOTE: Proper operation of the OTP control MUST be checked on a regular basis. To do this, increase main control setting above the OTP set point and ensure that OTP Control circuitry reacts as described above.

CALIBRATION INSTRUCTIONS

Your TOUCHMASTER control has been set by the factory as follows:

POM 70: POT 1- 100C; POT 2- 125C; POT 3- 175C; POT 4- 225C

If calibration temperatures were specified by the customer, the unit was calibrated in final testing at those values. Should re-calibration be desired, or necessary, follow the steps below.

CALIBRATION OF THUMB WHEEL MANUAL SET POINT CONTROL

DANGER: Calibration is performed with the unit power on. Extreme care must be taken when working behind the control panel. Hazardous voltages are present!

Calibrate as follows:

1. Turn unit power on at main switch.

2. Partially depress one of the set point selector switches to turn manual control of chamber over to the thumb wheel control.

3. Adjust the thumb wheel control to the desired calibration temperature. Allow the chamber to stabilize at temperature.

4. When chamber temperature stabilizes, trim the setting of the thumb wheel until the digital pyrometer displays the exact calibration temperature.

   NOTE: Make trimming adjustments to thumb wheel in very small increments, allowing 15 to 30 minutes each time for the chamber temperature to stabilize at that setting. As with any electronic control, changes in control setting will lead the physical system response by several minutes.

5. When digital display indicates exact calibration temperature and stabilizes, interrupt power to the unit with the fused disconnect or main circuit breaker.

   DANGER: Failure to remove power from unit creates a shock hazard behind the control panel.

6. Unscrew the four captive fasteners on the face of the control assembly and carefully pull the tray outward.

7. Loosen the allen-head set screw which fastens the thumb wheel to the shaft of the pot (Fig. 3). Use extreme care to not disturb the setting of the pot!

8. Change the placement of the thumb wheel on the pot's shaft so that the calibration scale of the thumb wheel lines up with the pointer.

9. When calibration is complete, tighten set screw firmly. Push tray assembly back into the unit and snug down the fasteners.

10. Restore power to unit, and allow chamber temperature to stabilize. Repeat the above steps as necessary for acceptable calibration.

CALIBRATION OF CONTROL SET POINT POTS

The following procedure is used to adjust the control set point pots to produce required temperatures for each set point switch. After all switches are dedicated, those settings should be recorded on the appropriate indicator "memory" pots.

NOTE: Stored "memory" values DO NOT change when set point value is changed.

Calibrate as follows:

1. Turn power on at main switch.

2. Partially depress one of the set point selector switches.

3. When all of the set point selector switches are out, thumb wheel setting controls chamber temperature. Set thumb wheel to the calibration temperature for set point control pot #1, allow chamber to stabilize at the desired temperature, note volt meter reading, and go to step 4.

4. Depress set point selector switch #1, and turn control set point pot until same volt meter reading obtained in step 3 is read. Control set point pot is now in rough calibration.

5. Allow chamber temperature to stabilize. Trim setting of control set point pot to obtain exact set point temperature reading as on digital display. Allow several minutes between adjustments to allow unit to stabilize.

6. When displayed chamber temperature is stable at desired value, calibration is complete. All control set point pots are adjusted in the same manner.

WARNING: Any control set point pot NOT set to a specific temperature should be adjusted to near ambient to avoid damage to a work load should a wrong selector switch be pushed by mistake.

STORAGE OF SET POINT SELECTOR SWITCH VALUES

After set point pots are calibrated at the desired operating temperatures, the settings of each set point selector switch must be stored.

WARNING:Careful adjustment of indicator set point pots is necessary to reduce the chance of work load damage. If indicator pot is set to show a value other than that which the selector switch will produce, a wrong set point entry may be made which could lead to destructive chamber temperatures.

To store values:

1. Depress set point selector switch #1.

2. Depress and hold PUSH TO READ button in.

3. Turn indicator set point pot #1 slowly (CW increases; CCW decreases). Digital display changes as pot is adjusted.

4. When display registers set point temperature for set point switch #1, stop turning and release the PUSH TO READ button. In the future, when ever selector switch #1 and the PUSH TO READ button are pushed at the same time, this stored value will be shown on the digital indicator. When the button is released, actual chamber temperature is displayed.

5. Repeat the above steps for the remaining selectors.

WARNING:Always confirm temperature setting when transferring from one temperature to another by pressing the PUSH TO READ button after selecting the new temperature.

6. **Bandwidth Control.** This controls the point at which proportioning action of temperature control begins. The bandwidth is narrowest when the control is set fully CW, and at its widest with the control set fully CCW.

NOTE: With bandwidth control set fully CCW, chamber may over shoot set point. If this occurs, set control farther CW to eliminate over shoot.

NOTE: Bandwidth is factory set at 1/4 turn CW from full CCW.

CAUTION: Altering bandwidth control will alter temperature control calibration.

7. **Zero Adjust Control.** (Fig. 5, Item B) Used in recalibrating set point indicator. Allows small changes in settings to be made without disturbing main control.

BALANCING MASTER AND SLAVE SYSTEMS (3-PHASE)

Heating circuits of 3-phase ovens are made up of three single phase heating elements. First phase power is controlled by the master control. Second and third phase power is controlled by two slave controls which respond to a signal supplied by the master. For proper loading of the 3-phase line, separate circuits must be balanced as follows:

1. Set phase selector switch in position 1.

2. Turn unit on. Select a moderately low temperature which will cause the volt meter to hold in the lower portion of the orange range when the unit temperature has stabilized.

3. Set phase selector switch in position 2. Volt meter should read about the same as in position 1.

4. Set phase selector in position 3. Volt meter should read about the same as in the first two positions.

5. If voltages DO NOT agree, balance the system. Open the pull out control panel, locate system 2 and 3 slaves, and adjust trim pots to provide balance as desired. (Fig. 5, Items C & D)

NOTE: When drawer is open, a safety interlock switch will interrupt power to the unit. Therefore, adjustments may have to be repeated as necessary to achieve balance.

WARNING: DO NOT OVER RIDE SAFETY INTERLOCK!

NOTE: For best results, perform this procedure after unit has stabilized, and voltage reading lies below the center of the orange band.

OFF-PANEL CONTROLS

A. MOTOR OVER LOAD PROTECTION

If motor protection heaters are over heated due to excessive current, power to unit is shut down (except for the main pilot lamp which remains lit). To reset protection device, loosen thumb screws at top of panel and drop panel down. Press white reset button on the motor over load relay after the cause of the ovewr load is eliminated.

Over load device is heat sensitive and will trip under high ambient temperatures, and/or high line voltage. High line voltage will increase the flow of current through the motor; if actual current draw of motor does not exceed data on motor name plate, replace motor heaters with one size larger heater. If over load relay continues to trip, fault lies in motor or motor relay.

B. PANEL SAFETY SWITCH

Shuts power from all exposed terminals and main power relay when control panel is dropped for service.

C. PURGE TIMER & DOOR SWITCH

Purge timer delays energization of heating elements. Door switch starts timer. Timer should be set to allow 4 changes of chamber air before time out initiates heat. Refer to NFPA 86A for full exhaust air setting details.

DANGER: DO NOT SET PURGE TIMER FOR LESS THAN 10 MINUTES. MINIMUM OF TEN MINUTES IS REQUIRED TO CLEAR CHAMBER TO AVOID POSSIBILITY OF EXPLOSION WHEN HEATER IS ENERGIZED.

D. BLOWER FAILURE PROTECTION

Pressure sensitive switch shuts down heating element if insufficient air flow exists in chamber.

E. FIRE EXTINGUISHER PORT

Port in rear wall is provided for customer addition of fire extinguishing system.

F. BLOW-OUT RELIEF PANEL & SAFETY CAGE

Installed back wall to prevent damage to chamber in case of violent pressure change. The safety cage limits the travel of the panel in case of an explosion.

G. FUSED DISCONNECT SWITCH

Located on left side of oven. Controls power to oven, and provides short circuit protection for entire unit.

H. ONE-PASS AIR FLOW SYSTEM

Allows adjustment of intake air to work chamber. Sliding the control knob to the rear of the chamber reduces air intake; toward the front increases air intake. Damper position of intake is dependent on operating temperature and material being processed.

This unit is designed to meet National Fire Protection Association (NFPA) requirements for processing materials which emit flammable or explosive vapors. Consult NFPA Bulletin 86A, Chapter 4 for ventilation rates for various materials and temperatures.

MAINTENANCE & TROUBLESHOOTING

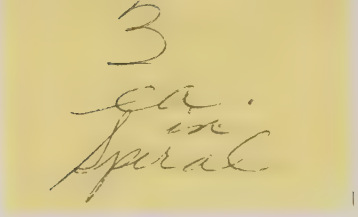
A. HEATING ELEMENTS

Heating compartment and elements should blown free of dust and dirt periodically to avoid impediment of the air flow. To inspect the compartment:

1. Disconnect all power to chamber.

2. Remove inner top panel from oven.

3. If heating elements must be replaced, drop control panel, remove the access cover from the compartment floor, disconnect wires from terminal studs and push element leads down into element compartment. Elements may be snapped out of hanger brackets, and leads pulled down through ceramic insulators. Reverse this procedure to install new element.



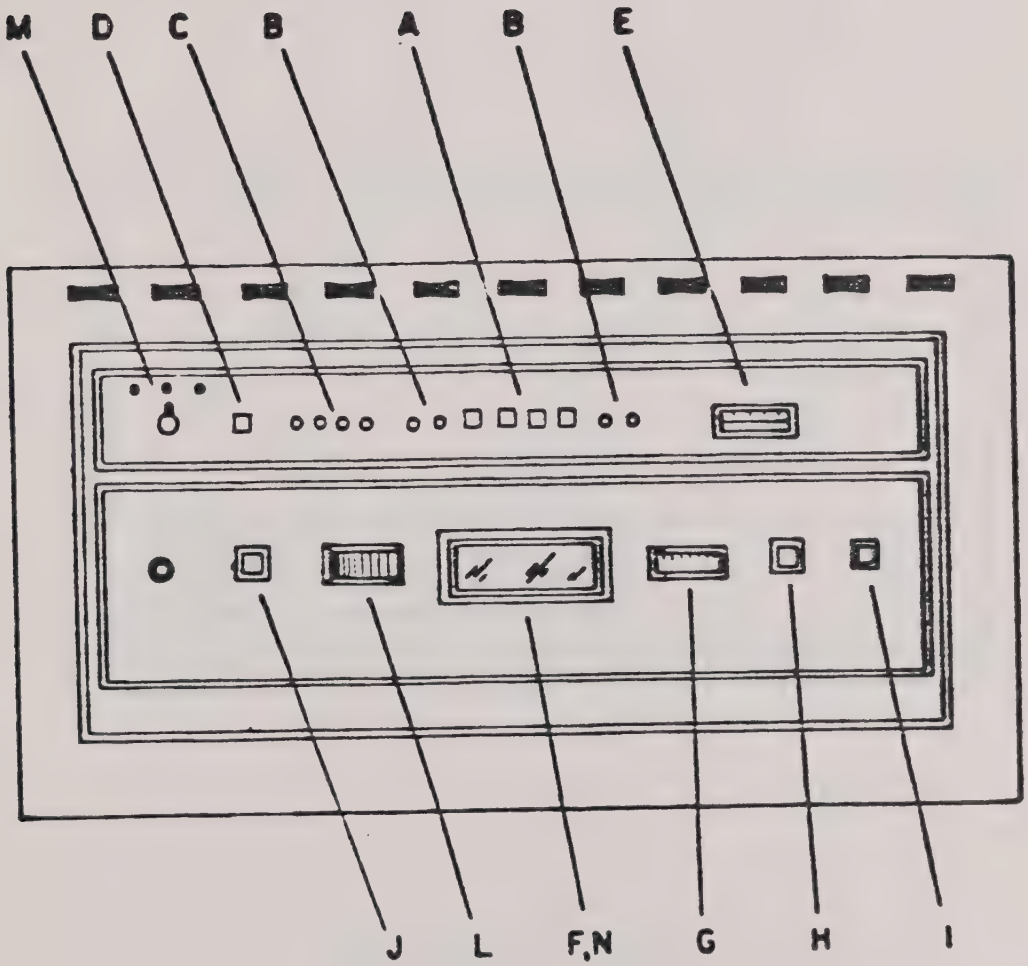


FIG. 1
TOUCH MASTER CONTROL PANEL
COMPONENT LOCATIONS

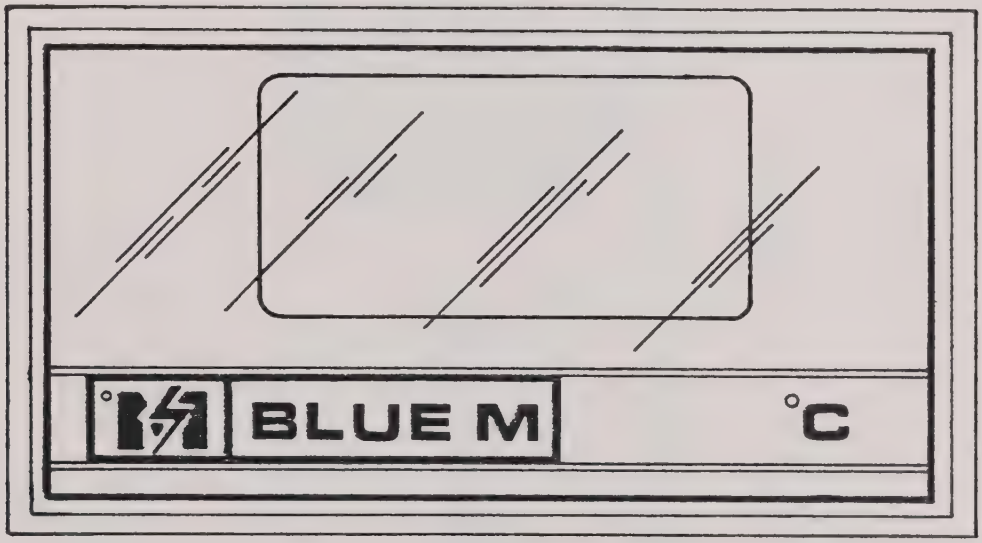


FIG. 2

TEMPERATURE INDICATOR

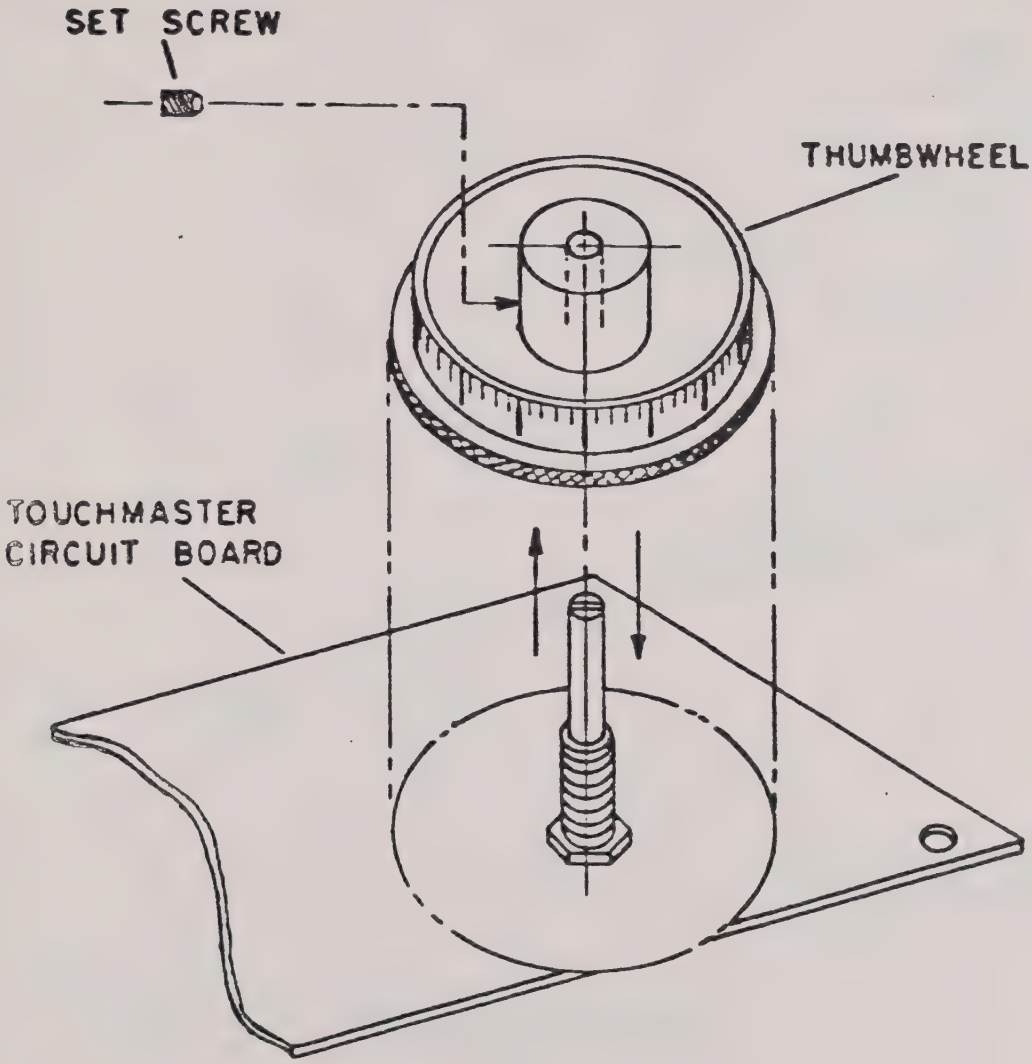


FIG. 3
CALIBRATION OF THUMBWHEEL MANUAL SETPOINT CONTROL

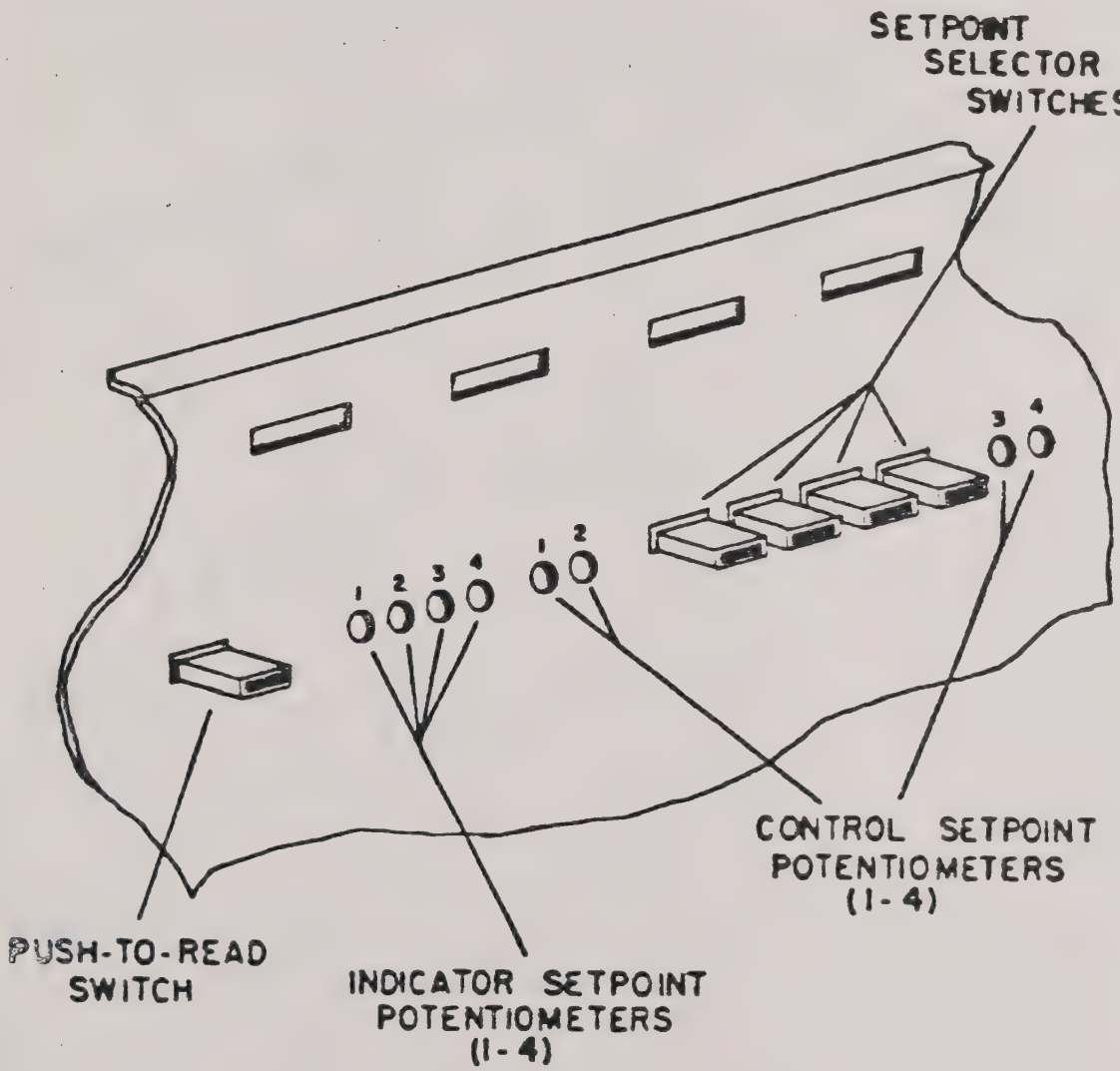


FIG. 4
CALIBRATION OF CONTROL SETPOINT POTENTIOMETERS

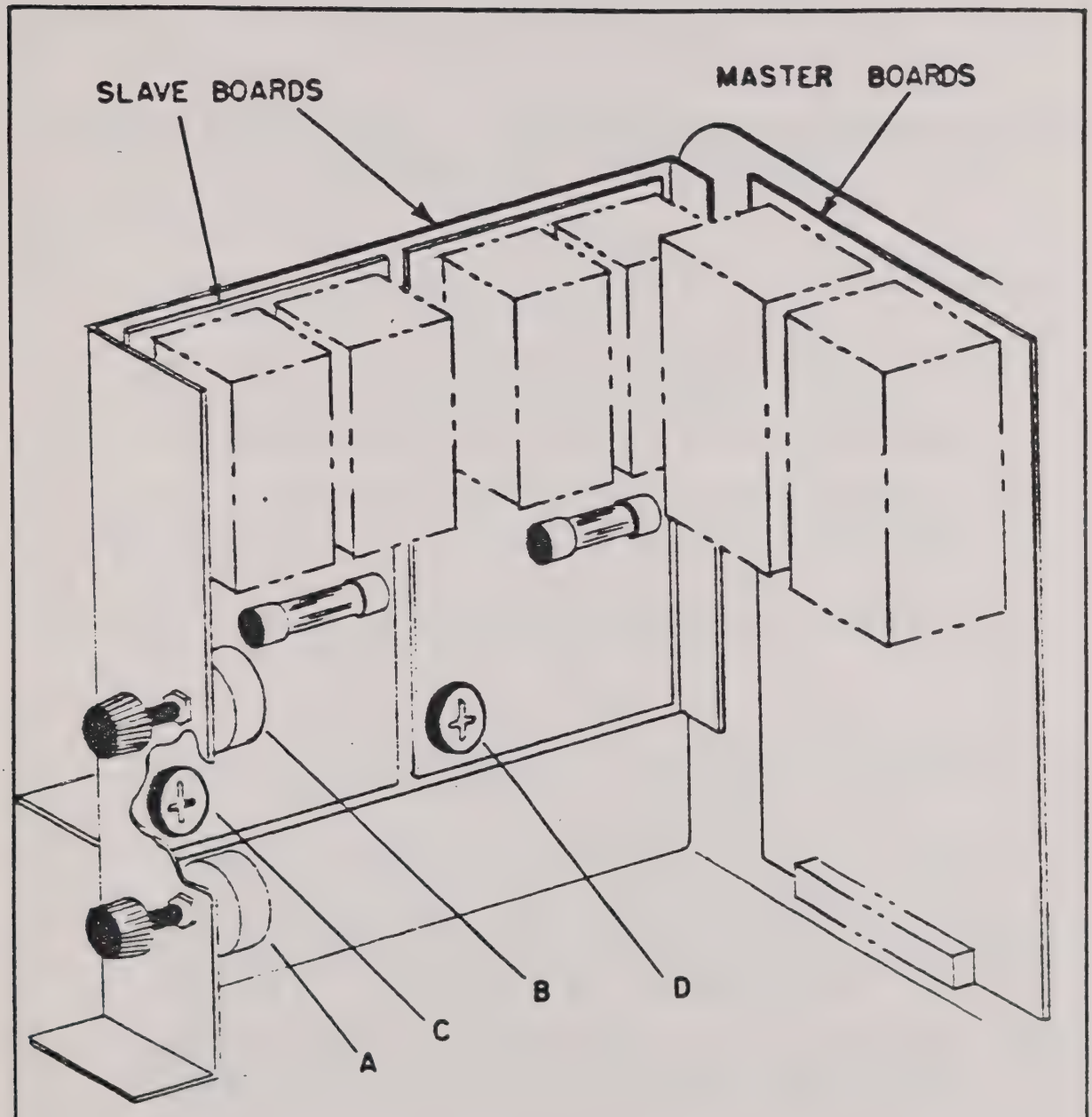


FIG. 5
LOCATION OF SCR PACKAGE ADJUSTMENTS
(THREE PHASE OVENS ONLY)

DATA & DIMENSIONAL INFORMATION

CLASS "A" BATCH OVENS

GENERAL SPECIFICATIONS & MODIFICATIONS FOR HEATING HAZARDOUS VOLATILES IN ACCORDANCE WITH RECOMMENDATIONS OF NFPA-BULL. 86A - CLASS "A" OVENS

1. Temperature Range: To 316C (600F).

2. Voltage: All models available for 208V/3Ph, 240V/3Ph, 480V/3Ph (must be specified).

3. Oven interior constructed of steel painted hi-temp aluminum. Exterior of oven is heavy guage steel enameled.

4. Oven interior seams and ports are WELDED VAPOR TIGHT.

5. 4" thick fiberglass insulation all sides, including door.

6. Suitable guards installed on front surfaces which exceed 160F.

7. Blow out relief panel installed through rear wall. Area of panel is 1 Ft^2/15 Ft^3 of oven volume.

8. Blower directly coupled to motor.

9. Damper on one-pass air flow system to have provision to prevent complete closure.

10. An air flow switch is provided to prevent heaters from operating in event of loss of air flow.

11. A purge timer delays energization of heating elements. Door switch starts timer. Timer should be set to allow 4 changes of chamber air before time out initializes heat. Refer to NFPA 86A for full exhaust air setting details.

    DANGER: DO NOT SET PURGE TIMER FOR LESS THAN TEN MINUTES. MINIMUM OF TEN MINUTES IS REQUIRED TO CLEAR CHAMBER TO AVOID POSSIBILITY OF EXPLOSION WHEN HEATER IS ENERGIZED!

12. Fused dis-connect switch installed.

13. Over temperature protection control (FM Approved) with a separate contactor installed.

14. Control compartment and all terminal housings are suitably grounded.

15. Blower system is electrically interlocked to prevent heater circuit from energizing unless blower is running.

16. All safety control circuits are 120VAC supplied through an instrument transformer with a grounded secondary.

17. All wiring conforms to the National Electrical Code.

18. A 2" diameter port through rear wall is supplied for customer installation of a fire extinguishing system, either CO_2 foam or water sprinkler type, per local jurisdiction.

NFPA Bulletin 86A is the oven standard adopted by the FIA (Factory Insurance Agency) and FM (Factory Mutual). All recommended safety features have been followed in the manufacture of this Class A Batch Oven.

This oven will only be approved by your submitting your application data with this Instruction to one of the above agencies.

NOTE: OSHA Standard for paint drying ovens (Section 1910.107 of sub part H) requires conforming with NFPA Bulletin 86A.

NOTE: An exhaust duct damper is neither provided nor recommended for this application.

WARNING: THIS UNIT MUST BE OPERATED IN STRICT ACCORDANCE WITH NFPA BULLETIN 86-A. CONSULT WITH FIRE SAFETY AUTHORITY FOR INTERPRETATION AND/OR ADDITIONAL REQUIREMENTS.

DANGER: SERIOUS INJURY OR PROPERTY DAMAGE COULD RESULT FROM OPERATION IN VIOLATION OF THE ABOVE STRICTURES, OR USE WHICH DEVIATES FROM ORIGINAL DESIGN PARAMETERS. ALWAYS CONSULT WITH SAFETY ENGINEERING AUTHORITY BEFORE ALTERING USAGE PARAMETERS.

OVEN SAFETY DESIGN FORM

This oven is designed for the conditions indicated below, and is approved for such use.

WARNING: DO NOT DEVIATE FROM THESE CONDITIONS WITHOUT APPROVAL

This information is required in compliance with FIA and FM:

Name of Owner:_____

Location:_____
city state plant building floor

Purpose:_____
(i.e.: baking, paint, enamel, japan, food, dehydrating, etc.)

Kind of material handled:_____
Lbs/Hr. or batch:_____

Type of heating system:_____Heat medium:_____
(convection, radiant, etc.) (gas, electricity, etc.)

Solvents used:_____
(i.e.: alcohol, naptha, benzol, turpentine, etc.)

Solvents and volatiles entering oven:_____
gals./batch/hour

Purging interval:_____ Do products of combustion enter oven?___

Baking time (batch oven):_____

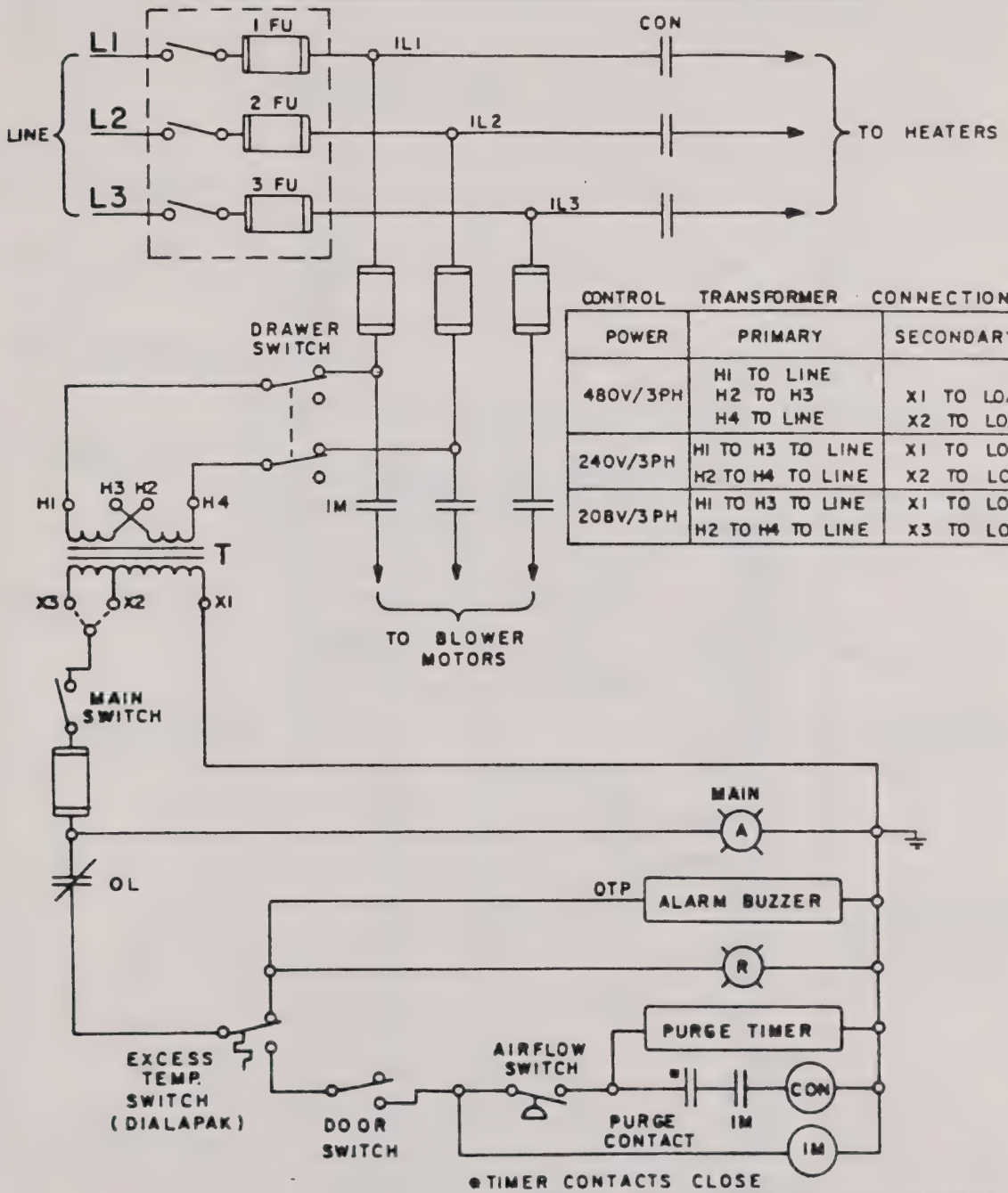
Oven temperature (degrees F):_____

Oven dimensions: Inside depth;_____ Width_____ Height_____

Oven volume in cubic Ft.:_____

Fresh air admitted into oven in cubic Ft.3/min. (70F):_____

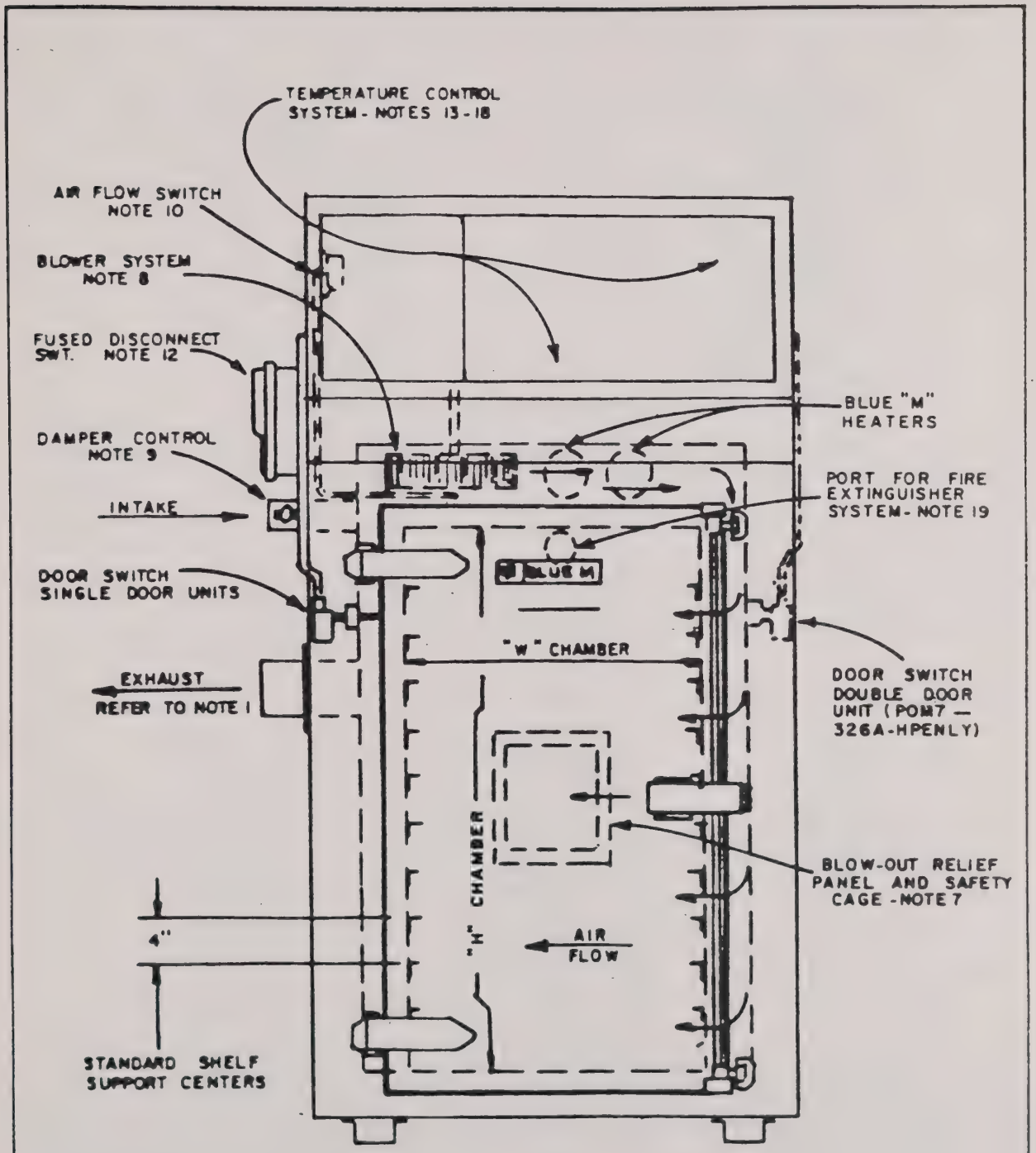
Blow out relief area:_____



CONTROL TRANSFORMER CONNECTIONS

POWER	PRIMARY	SECONDARY
480V/3PH	H1 TO LINE H2 TO H3 H4 TO LINE	X1 TO LOAD X2 TO LOAD
240V/3PH	H1 TO H3 TO LINE H2 TO H4 TO LINE	X1 TO LOAD X2 TO LOAD
208V/3PH	H1 TO H3 TO LINE H2 TO H4 TO LINE	X1 TO LOAD X3 TO LOAD

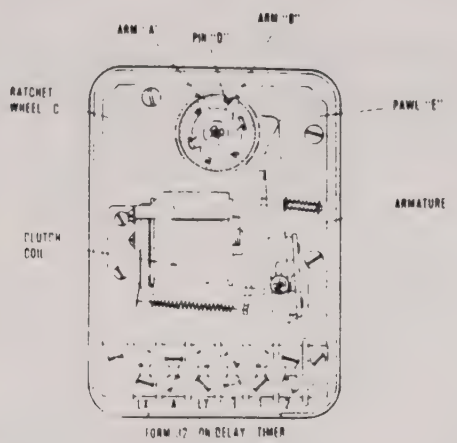
BLUE M
A UNIT OF GENERAL SIGNAL


TEMPERATURE CONTROL SYSTEM - NOTES 13-18
AIR FLOW SWITCH NOTE 10
BLOWER SYSTEM NOTE 8
FUSED DISCONNECT SWT. NOTE 12
DAMPER CONTROL NOTE 9
INTAKE
DOOR SWITCH SINGLE DOOR UNITS
EXHAUST
REFER TO NOTE 1
BLUE "M" HEATERS
PORT FOR FIRE EXTINGUISHER SYSTEM - NOTE 19
BLUE M
"W" CHAMBER
DOOR SWITCH DOUBLE DOOR UNIT (POM7 — 326A-HPENLY)
"H" CHAMBER
BLOW-OUT RELIEF PANEL AND SAFETY CAGE - NOTE 7
AIR FLOW
4"
STANDARD SHELF SUPPORT CENTERS

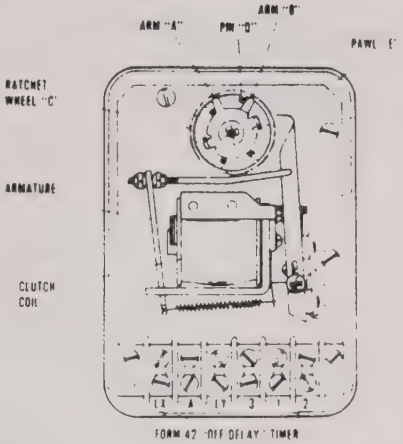
BLUE M
A UNIT OF GENERAL SIGNAL

EAGLE TIMOFLEX RESET TIMER

The timoflex is powered by a synchronous motor, and is normally used as a time delay device. Any pilot switch (push button, limit switch, relay) may be used to start delay period. Several forms of control action are available, as outlined below.



FORM 32 "ON DELAY" TIMER



FORM 42 "OFF DELAY" TIMER

OPERATION

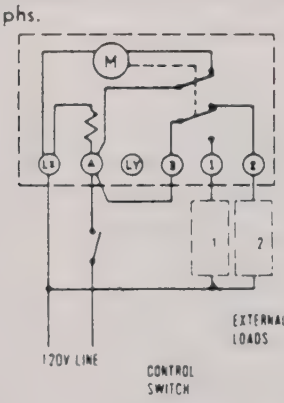
The time setting is determined by the angular spacing between arms (A) and (B), attached to the timoflex motor shaft. To set timer, grasp ears of front arm (A), pull outward, and turn to desired setting. Upon releasing front arm, a spring locks both arms together.

Ratchet wheel (C) is also carried on motor shaft. The wheel has a stop pin (D) and a reset spring which normally holds the pin against arm (B).

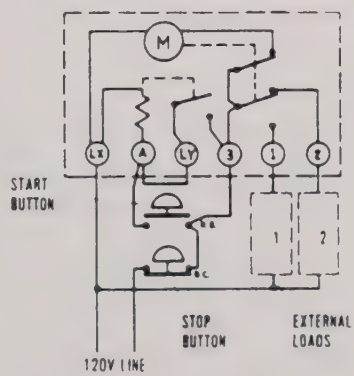
Energizing the timoflex coil* engages pawl (E) with ratchet wheel. The pawl holds wheel stationary during timing period, until timer motor rotates arm (A) against pin. Continued rotation moves ratchet wheel which forces pawl downward to trip switch.

De-energizing coil* resets timer. Pawl is released from ratchet wheel, allowing switch to reset, and ratchet wheel resets with its pin again resting against arm (B).

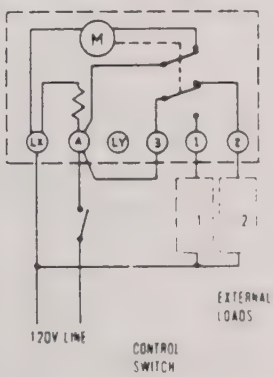
*On timoflex Form 32 and 33, coil action is as described above. On Form 42, coil action is reversed (See following paragraphs.



Form 32: Use with a maintained contact control switch which closes and holds the timer energized during its timing interval. External load devices connected to terminal #1 will be de-energized, #2 will be energized. At the end of the preset delay period #1 will be energized, #2 will be de-energized. Timer motor will be shut off. Opening control switch resets timer, returning contacts to reset position.



Form 33: Similar to Form 32, except that an additional contact is used which closes when timer coil is energized. This contact maintains itself during timing, allowing use of a momentary contact control switch. A separate normally closed switch must be used for resetting timer.



Form 42: This model has the coil action reversed. Closing the control switch (energizing coil) resets timer. External load devices connected to terminal #1 will be de-energized, #2 will be energized. Opening control switch (de-energizing coil) starts timing period. At the end of timing period, contacts trip. #1 will be energized, #2 de-energized. Timer will stay in this timed-out position, with motor shut off, until control switch is closed again. Switch closure may be of any duration over ¼ second; timing starts when switch opens. NOTE: This model WILL NOT RESET if power fails but MERELY STOPS, and will resume operation when power is restored.

BLUE M

A UNIT OF GENERAL SIGNAL

BLUE ISLAND, ILLINOIS 60406

Phone: (312) 448-7755 385-8000 TWX 910-689-2268

Honeywell

Recorders, Indicators and Controllers
45-02-25-02
6/80

Dialapak — High and Low Limit Controllers

Product Manual

Models AV50, AV51, AV52, AV53, AV54, AV55, AV56, and AV57

Table of Contents

Publication No.	Title
011-307	Model Selection Guide
52-02-03-02	Specification
45-02-05-02	Technical Data
45-02-09-01	Installation
45-02-11-02	Operating Data
45-02-13-01	Service Data
45-02-14-01	Parts List

WARRANTY

The Company warrants all components of the Dialapak to be free from defects in workmanship and material under normal use and service. Equipment returned transportation prepaid to the Company's originating factory within 24 months from the date of the date code stamped on the device and found by the Company's inspection to be defective in workmanship or material will be repaired or replaced, at the Company's option, free of charge and returned prepaid. Relays and lamps shall not be covered by warranty if they fail by reason of wear or burnout through usage. WITH EXCEPTION OF THE 24 MONTH WARRANTY, SET FORTH ABOVE, THE COMPANY MAKES NO EXPRESS WARRANTIES, NO WARRANTY OF MERCHANTIBILITY AND NO WARRANTIES WHICH EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF. In no event will the Company be liable for indirect, special or consequential damages of any nature whatsoever.

Process Control Division, 1100 Virginia Drive, Fort Washington, PA 19034

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Dialapak Indicator/Controller

Model Selection Guide

Instructions

- Select primary function from Table I. The arrow to the right marks the selections available.
- Make one selection from each Table, II through V, using the column below the proper arrow. A dot (•) denotes unrestricted availability. Letters (example **c**) denote restricted availability. Restrictions follow Table V, with squares (■) below the letter identifying the limitations.
- A complete model number must have the designated number of digits.

┌─ I ─┐ ┌II┐┌III┐┌IV┐ ┌─ V ─┐
└─────┘ └──┘└───┘└──┘ └─────┘

Table I Primary Function

Indication	Control		Selection	Availability									
Non-indicating with Analog Set Point	On-Off		AV31			↓							
	Manual Reset Only	High Limit Low Limit	AV51 AV53				↓ ↓						
	Manual Reset with Automatic Reset on Startup or after Electrical Failure	High Limit Low Limit	AV55 AV57				↓ ↓						
	Time Proportioning	Single Mode Three Mode	AV71 AV73					↓ ↓					
	Current Proportioning – Reverse Acting	Single Mode Three Mode	AV91 AV93						↓ ↓				
Indicating with Analog Set Point	Non-Control (Indicator Only) On-Off		AV10 AV30	↓	↓								
	Manual Reset Only	High Limit Low Limit	AV50 AV52				↓ ↓						
	Manual Reset with Automatic Reset on Startup or after Electrical Failure	High Limit Low Limit	AV54 AV56				↓ ↓						
	Time Proportioning	Single Mode Three Mode	AV70 AV72							↓ ↓			
	Current Proportioning – Reverse Acting	Single Mode Three Mode	AV90 AV92								↓ ↓		
Indicating with Digital Set Point	On-Off		AV30									↓	
	Time Proportioning	Single Mode Three Mode	AV70 AV72									↓ ↓	
	Current Proportioning	Single Mode Three Mode	AV90 AV92										↓ ↓

Table II Power, Set Point

Set Point Type	Frequency - Hertz	Voltage											
Analog	50/60	120 Vac 220/240 Vac	1 2	• •	• •	• •	• •	• •	• •	• •	• •		
Digital	50/60	120 Vac 220/240 Vac	6 7								• •	• •	• •

Model Number
AV□ □ (Digital)
AV□ □ (Analog)

Availability

Table III Auxiliary Function

	Selection	10	30	31	50 51 52 53 54 55 56 57	71 73	91 93	70 72	90 92	30	70 72	90 92
None	A	•	•	•	•	•	•	•	•	•	•	•
Deviation Alarm	B		k	k		k	k	k	k	k	k	k
Second Set Point Process Variable Alarm	C		k	k		k	k	k	k			
Heat Cool	D					•		•			•	
Remote Reset	E				•							
Deviation Auxiliary Alarm	F		m	m		m	m	m	m	m	m	m
Second Set Point Process Variable Auxiliary Alarm	G		m	m		m	m	m	m			
Dual Deviation Alarm	H		•	•		•	•	•	•	•	•	•

Table IV Output, Set Point, Burnout

Output	Set Point	Burnout	Selection	10	30	31	50 51 52 53 54 55 56 57	71 73	91 93	70 72	90 92	30	70 72	90 92
Indicator Only			A	•										
Mechanical Relay or Current	Local	Upscale	B		c	c	c	c	c	c	c	c	c	c
		Downscale	C		d	d	d	d	d	d	d	d	d	d
	Local/Remote	Upscale	D		c	c		c	c	c	c	c	c	c
		Downscale	E		d	d		d	d	d	d	d	d	d
Solid State Relay	Local	Upscale	F		c	c		c		c		c	c	
		Downscale	G		d	d		d		d		d	d	
	Local/Remote	Upscale	H		c	c		c		c		c	c	
		Downscale	J		d	d		d		d		d	d	

Table V Sensor Type, Range and Scale

Sensor	Type	Range	Scale	Selection	10	30	31	50 51 52 53 54 55 56 57	71 73	91 93	70 72	90 92	30	70 72	90 92
Thermocouple		0 to 399 °F	±50	500									•	•	•
		0 to 599 °F		501									•	•	•
		0 to 799 °F		502									•	•	•
		0 to 999 °F		503									•	•	•
		Range and Scale													
		°Fahrenheit	**°Celsius**												
	J	0 to 200		100	•	•	•	•	•	•	•	•			
		0 to 250		142	•	•	•	•	•	•	•	•			
		0 to 300		120	•	•	•	•	•	•	•	•			
		0 to 400		101	•	•	•	•	•	•	•	•			
		0 to 500		134	•	•	•	•	•	•	•	•			
		0 to 600		102	•	•	•	•	•	•	•	•			
		0 to 800		103	•	•	•	•	•	•	•	•			
		0 to 1000		123	•	•	•	•	•	•	•	•			
		0 to 1200		104	•	•	•	•	•	•	•	•			
		0 to 1400		145	•	•	•	•	•	•	•	•			
			0 to 100	141	•	•	•	•	•	•	•	•			
			0 to 200	105	•	•	•	•	•	•	•	•			
			0 to 300	125	•	•	•	•	•	•	•	•			
			0 to 400	106	•	•	•	•	•	•	•	•			
			0 to 600	107	•	•	•	•	•	•	•	•			
	K	0 to 1000		108	•	•	•	•	•	•	•	•			
		0 to 1200		109	•	•	•	•	•	•	•	•			
		0 to 1600		110	•	•	•	•	•	•	•	•			
		0 to 1800		147	•	•	•	•	•	•	•	•			
		0 to 2000		111	•	•	•	•	•	•	•	•			
		0 to 2200		124	•	•	•	•	•	•	•	•			
		0 to 2400		112	•	•	•	•	•	•	•	•			
		0 to 2500		143	•	•	•	•	•	•	•	•			
			0 to 600	113	•	•	•	•	•	•	•	•			
			0 to 1000	114	•	•	•	•	•	•	•	•			
			0 to 1200	130	•	•	•	•	•	•	•	•			
			0 to 1300	127	•	•	•	•	•	•	•	•			

Table V continued on following page

Model Number
AV□ □ (Digital)
AV□ □ (Analog)

Availability

Selection	10	30	31	50 51 52 53 54 55 56 57	71 73	91 93	70 72	90 92	30	70 72	90 92

Table V (Continued)

Sensor	Type	Range and Scale °Fahrenheit	Range and Scale °Celsius	Selection	10	30	31	50 51 52 53 54 55 56 57	71 73	91 93	70 72	90 92	30	70 72	90 92
Thermocouple	R	0 to 3000	.....	116	•	•	•	•	•	•	•	•			
			0 to 1600	117	•	•	•	•	•	•	•	•			
	S	0 to 3000	.....	140	•	•	•	•	•	•	•	•			
			0 to 1600	122	•	•	•	•	•	•	•	•			
	T	−350 to + 250	.....	128	•	•	•	•	•	•	•	•			
		−200 to + 100	.....	129	•	•	•	•	•	•	•	•			
		−200 to + 200	.....	135	•	•	•	•	•	•	•	•			
		−160 to + 120	.....	121	•	•	•	•	•	•	•	•			
		−130 to + 430	.....	126	•	•	•	•	•	•	•	•			
		−125 to + 375	.....	118	•	•	•	•	•	•	•	•			
			−100 to + 200	119	•	•	•	•	•	•	•	•			
			0 to 200	131	•	•	•	•	•	•	•	•			
			0 to 400	132	•	•	•	•	•	•	•	•			
Resistance Temperature Detector (RTD)	100 ohm Platinum	−125 to + 375	.....	203	•	•	•	•	•	•	•	•			
		0 to 100	.....	204	•	•	•	•	•	•	•	•			
		0 to 200	.....	205	•	•	•	•	•	•	•	•			
		0 to 300	.....	237	•	•	•	•	•	•	•	•			
		0 to 400	.....	206	•	•	•	•	•	•	•	•			
		0 to 800	.....	207	•	•	•	•	•	•	•	•			
			0 to 100	208	•	•	•	•	•	•	•	•			
			0 to 250	222	•	•	•	•	•	•	•	•			
			0 to 400	218	•	•	•	•	•	•	•	•			
	200 ohm Platinum	−125 to + 375	.....	211	•	•	•	•	•	•	•	•			
		−100 to + 500	.....	235	•	•	•	•	•	•	•	•			
		0 to 50	.....	236	•	•	•	•	•	•	•	•			
		0 to 225	.....	212	•	•	•	•	•	•	•	•			
		0 to 60	(Depression)	210	•	•	•	•	•	•	•	•			
			−100 to + 100	214	•	•	•	•	•	•	•	•			
			−100 to + 200	233	•	•	•	•	•	•	•	•			
			−100 to + 300	234	•	•	•	•	•	•	•	•			
			−20 to + 110	215	•	•	•	•	•	•	•	•			
		(Depression)	0 to 35	213	•	•	•	•	•	•	•	•			
Relative Humidity	Honeywell Gold Grid Q457B SSP138B, 144D	Range	Scale												
		2 to 100%	2 to 200%	223	•	g	g	•	g	h	g	h			
Dewprobe	Honeywell SSP129	−40 to + 160°F	−40 to + 160°F	209	•	•	•	•	•	•	•	•			
		−40 to + 70°C	−40 to + 70°C	216	•	•	•	•	•	•	•	•			
Millivolt	dc	0 to 10 mV	0 to 100%	200	•	•	•	•	•	•	•	•			
		0 to 50 mV		201	•	•	•	•	•	•	•	•			
Milliampere	dc	4 to 20 mA	0 to 100%	202	•	•	•	•	•	•	•	•			
Micro Amp	dc	0 to 10 Micro Amp	0 to 10 Micro Amp	244		•	•	•							

Restriction Letter	Limitation
Ordering Restrictions	
c	Available only with Thermocouple, Millivolt or Resistance Temperature Detector Sensor Type
d	Available only with Thermocouple, Relative Humidity, Millivolt or Milliampere Sensor Type
g	If Table III, B, C, D, F, G or H is selected, Table IV, G or J must also be selected
Application Restrictions	
g, h	Rate must be set to ZERO (giving only 2 mode control) when a 3 mode controller (Table I, AV72, AV73, AV92, AV93) has an auxiliary function (Table III, B, C, D, F or G) or a mechanical relay (Table IV, C or E)
g, h	Mechanical relay or auxiliary function loads must not exceed 120 Vac
k	When input exceeds the auxiliary set point, auxiliary relay contacts 15 and 16 are open and 14 and 16 are closed
k	When input exceeds the auxiliary set point, the auxiliary light (red) is on
m	When the input is below the auxiliary set point, the auxiliary light (red) is on

Dialapak Indicator/Controller

Supplementary Accessories

The following accessories may be ordered with the instrument or later, as desired.

Accessories

	Dimensions				Maximum Cutout				Part Number
	Inches		Millimeters		Inches		Centimeters		
	Width	Height	Width	Height	Width	Height	Width	Height	
Adaptor Plates with Mounting Hardware	5.25	8.875	13,3	22,5	4.5	8.125	11,4	20,6	24400104–001
	5.375	7.5	13,6	19,1	4.625	6.75	11,7	17,1	24400104–002
	8.25	7.25	21,0	18,4	7.5	6.5	19,0	16,5	24400104–003
	8.375	8.875	21,3	22,2	7.625	8.125	19,3	20,6	24400104–004
	9.875	10.875	25,1	27,6	9.125	10.125	23,1	25,6	24400104–005
Terminal Box Assembly									24400072–001
Surface Mounting Bracket									24400071–001
Splash Cover									24400107–001
					Input				
Local/Remote Calibration Board					4–20 Milliamperes dc				24400123–001
					0–2 or 0–5 Volts dc				24400123–002
					0–1000 Ohm				24400123–003

Dialapak Controllers
All Models †

Specification

Function
Dialapak general purpose industrial controllers monitor and control temperatures in applications such as environmental chambers, plastic processing machines, furnaces and ovens, and packaging machinery. They can also be used in applications where the process variable can be converted into an electric analog signal, such as pressure and relative humidity.

Description
Dialapak controllers are available in a variety of types, including indicating controllers with either analog or digital set point means, non-indicating controllers with analog set point means, a non-indicating analog set point potentiometer, and a non-control indicator. See Table 1 for the specific model numbers of the various Dialapak devices.

Analog Set Point Controllers (Figure 1)
In the analog set point controller, the set point is established through a potentiometric adjustment made by turning a ring (set point dial) around the front panel scale. The set point can be set over the entire calibrated scale length. The set point dial is connected directly to the set point pot wiper for precise and accurate setting. A screwdriver-operated, set point dial lock prevents accidental or unauthorized changes in its setting.

The front panel scale on the indicating models also includes a pointer that indicates to the scale value of the process variable.

Digital Set Point Controllers (Figure 2)
In the digital set point controller, the set point is established by indexing three* thumbwheel switches on the front panel to any three-digit number in engineering units from 000 to 999. These switches minimize the chance of operator error and ensure precise and repeatable set point adjustment. A vertical scale meter indicates the amount and direction of any deviation from set point.

† See Table 1 for models.

*Four thumbwheel switches can be supplied on special orders.

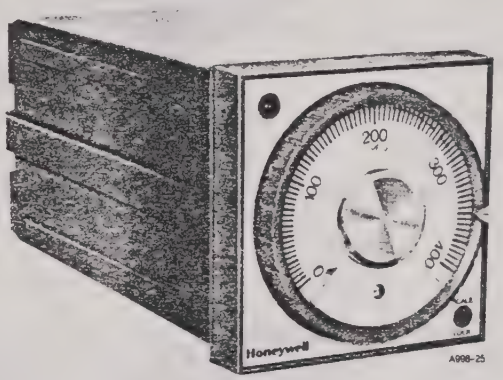


Figure 1 — Typical Dialapak Controller with Analog Set Point

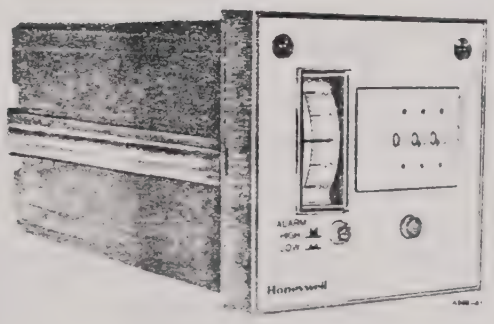


Figure 2 — Typical Dialapak Controller with Digital Set Point

Analog Set Point Potentiometer (Figure 3)

The analog set point potentiometer provides set point functions only, and is used for adjusting the set point of a process from a location remote from the primary controller. This device provides potentiometric adjustments from 0 to 1000 ohms (±10%) calibrated in engineering units compatible with the range scale of the associated controller. The set point is established by turning a ring (set point dial) around the front panel scale. The set point dial is connected directly to the set point pot wiper for precise and accurate setting. A screwdriver-operated, set point dial lock prevents accidental or unauthorized changes in its setting.

Non-Control Indicator (Figure 4)

The non-control indicator is a full-scale indicating device that displays process variable values in easy-to-read engineering units.

Enclosure

All Dialapak controllers come in a molded plastic case (1/4 DIN) designed for panel mounting with a U-shaped bracket that is supplied. They occupy less than 100 cubic inches. Screw terminals for field connections are molded into the rear of the case. Vibration resistant construction enables Dialapak instruments to be mounted directly on the machine where it is most convenient to the operator.

Chassis

The plug-in chassis consists of printed wiring boards and a front assembly. Printed wiring boards vary in number and length depending on model. They snap-fit into the rear of the front assembly, and are electrically connected through post and receptacle connections. Boards interface with field connections through plug-in receptacle in rear of case. Boards are of solid-state circuit design and include sockets for plug-in relays, when supplied. Control adjustments, such as proportional band, cycle time, rate, etc., are made through post and receptacle connections on the lower board.

The front panel assembly includes various front panel adjustments, indicator lights, a means to establish the primary set point (analog or digital), and a meter (on indicating models). The sealed meter combines with a 250-angular degree, 2.8-inch diameter scale on analog set point models to give excellent readability. Front assembly has a latching arrangement to hold the chassis in the case

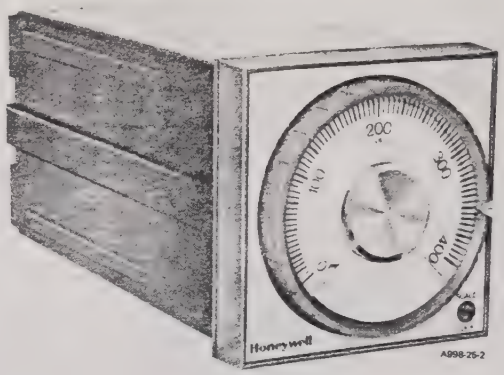


Figure 3 — Dialapak Set Point Potentiometer

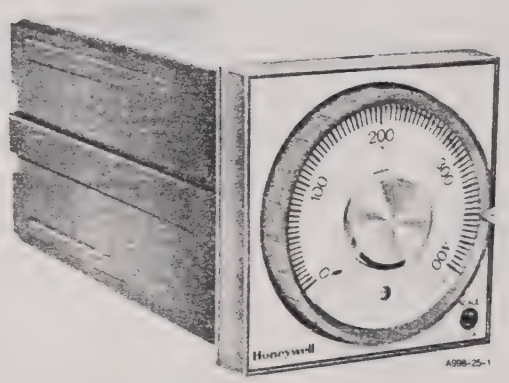


Figure 4 — Dialapak Indicator

Control Selections

Basic Control Types

On-Off: Control is on or off depending on the value of process variable relative to set point (below or above). Ideal for slow changing processes

Limit - High and Low: External alarm circuitry is activated when process is in an out-of-limit condition. Manual resetting is required after shutdown; however, some models have automatic reset on startup or after electrical failure. Protects equipment and personnel from effects of abnormally high or low temperature.

Time Proportioning (One Mode and Three Mode): Cycles a relay on and off. The ratio of on time to total cycle time is proportional to the deviation between the input (process variable) and set point. Ideal for proportional control of on-off final control elements. One mode (proportional band only) is for processes with little or no load changes, and three mode (proportional band, rate, and auto-reset) for processes with frequent load changes.

Current Proportioning (One Mode and Three Mode): Supplies proportional direct current output for final control elements which operate from a 4 to 20 mA dc input. Output varies as process variable changes. Reverse action output is standard.

TABLE 1 — Dialapak Controllers

Basic Model	Type of Controller	Type of Indication			Type of Primary Set Point		
		PV	Dev.	None	Analog	Digital	None
AV10	Indicator Only	●					●
AV020AA	Set Point Potentiometer			●	●		
AV30	On-Off	●			●		
AV30	On-Off		●			●	
AV31	On-Off			●	●		
AV50	High Limit*	●			●		
AV51	High Limit*			●	●		
AV52	Low Limit*	●			●		
AV53	Low Limit*			●	●		
AV54	High Limit†**	●			●		
AV55	High Limit†**			●	●		
AV56	Low Limit†**	●			●		
AV57	Low Limit†**			●	●		
AV70	One-Mode Time Proportioning	●			●		
AV70	One-Mode Time Proportioning		●			●	
AV71	One-Mode Time Proportioning			●	●		
AV72	Three-Mode Time Proportioning	●			●		
AV72	Three-Mode Time Proportioning		●			●	
AV73	Three-Mode Time Proportioning			●	●		
AV90	One-Mode Current Proportioning†	●			●		
AV90	One-Mode Current Proportioning†		●			●	
AV91	One-Mode Current Proportioning†			●	●		
AV92	Three-Mode Current Proportioning†	●			●		
AV92	Three-Mode Current Proportioning†		●			●	
AV93	Three-Mode Current Proportioning†			●	●		
AV94	One-Mode Current Proportioning††	●			●		
AV94	One-Mode Current Proportioning††		●			●	
AV95	One-Mode Current Proportioning††			●	●		
AV96	Three-Mode Current Proportioning††	●			●		
AV96	Three-Mode Current Proportioning††		●			●	
AV97	Three-Mode Current Proportioning††			●	●		

* Manual reset required after power interruption.
** Automatic reset after power interruption while process variable is within limit condition
† Reverse action output (standard)
†† Direct action output

Auxiliary Control Types (Table 2)
Deviation Alarm and Deviation Auxiliary Alarm: Actuates a SPDT relay output when the process variable deviates from the primary set point. The operating point is adjustable within a specific band around the primary set point, and is set by a screwdriver adjustment on the face of the instrument.

Dual Deviation Alarm: Actuates separate SPST relays when process variable deviates above (high alarm) or below (low alarm) set point. The operating points of the relays are individually adjustable within specific bands above and below the primary set point. The operating points are set by individual screwdriver adjustments on the face of the instrument.

Process Alarm and Process Auxiliary Alarm:* A SPDT relay output with a completely independent operating point which can be set at any point on the scale. The operating point is set by a knob in the center of the instrument face. This function can be used for either alarm or control purposes.

Heat-Cool Output: Available on time-proportioning models only, the heat-cool output selection provides two time proportioning outputs, one above the set point and one below the set point, for use on those processes which require both heating and cooling to maintain set point. Proportional band and cycle time are independently selectable through post and receptacle connections on the printed wiring board. Dead band between heating and cooling is adjustable from the front of the instrument.

Remote Reset: Applicable only to the limit controller, the remote reset option enables the limit controller to be reset from a remote location by a normally open, momentary contact switch. The use of the remote reset option does not disable the local reset function mounted in the instrument, although the local reset button is easily removed to prevent resetting the limit controller locally.

Output to Recorders (Not Selectable): All three mode controllers, models with alarm, and dual output time proportioning models provide a 0 to 5 Vdc process variable signal for input to indicators, recorders, computers, etc.

*Not available on digital set point models

TABLE 2 — Auxiliary Control Functions

Basic Model	Auxiliary Control Functions (One selection only)							
	Dev. Alarm	Dev. Aux. Alarm	Dual Dev. Alarm	Process Alarm*	Process Aux. Alarm*	Heat-Cool Output	Remote Reset	None
AV10								●
AV020AA								●
AV30	●	●	●	●	●			●
AV31	●	●	●	●	●			●
AV50							●	●
AV51								●
AV52							●	●
AV53							●	●
AV54							●	●
AV55							●	●
AV56							●	●
AV57							●	●
AV70	●	●	●	●	●	●		●
AV71	●	●	●	●	●	●		●
AV72	●	●	●	●	●	●		●
AV73	●	●	●	●	●	●		●
AV90	●	●	●	●	●			●
AV91	●	●	●	●	●			●
AV92	●	●	●	●	●			●
AV93	●	●	●	●	●			●
AV94	●	●	●	●	●			●
AV95	●	●	●	●	●			●
AV96	●	●	●	●	●			●
AV97	●	●	●	●	●	●		●

*Not available on digital set point models.

Options

Solid State Relay Output
Primary relay output is a plug-in, solid-state relay of normally open contact configuration.

Downscale Burnout
For thermocouple, millivolt and relative humidity actuations, this option is a form of sensor break protection which drives the instrument to minimum downscale value in the event of an open circuit in the sensor or sensor leadwire.

Upscale Burnout
For thermocouple, millivolt, and resistance bulb actuations, this option is a form of sensor break protection which drives the instrument to maximum upscale value in the event of an open circuit in the sensor or sensor leadwire. On heating applications, this feature simulates a high temperature condition, shutting down the heating system to prevent damage due to high temperature.

Local/Remote Set Point
Set point can be established locally or by an optional remote signal provided by a potentiometer (1000 ohms), a voltage (0 to 2 or 0 to 5 Vdc), or a current (4 to 20 mA) source. Used with on-off, time proportioning, and current proportioning controllers only.

NOTE. Dialapak Model AV020AA Set Point Potentiometer can be used for the remote set point for a potentiometric signal source

Specifications

Operating Conditions

	Reference Conditions	Rated Conditions	Extreme Conditions
Ambient Temperature	25 ±1°C 77 ±1°F	5 to 50°C 41 to 122°F	−10 to 60°C 14 to 140°F
Relative Humidity (%)	50 ±5*	0 to 70*	0 to 95*
Vibration	0.5g at 58 Hz (0.5g at 3500 repeats/minute).		
Power Requirement	120 or 220/240 Vac, 50/60 Hz (as specified); rated for operation on line voltage between 102 and 132 Vac or 198 and 250 Vac, 50/60 Hz.		

*The maximum moisture content must not exceed 400 grains of water per pound of dry air.

Performance

Repeatability	Typically ±0.1% of span.
Control Stability	Maximum 24 hour drift under static voltage and ambient conditions equals 15 microvolts or ±0.5% of span, whichever is greater.
Set Point Accuracy	*Analog Type:* Nominally ±0.75% of span at reference conditions. *Digital Type:* Nominally ±0.5% of span at reference conditions.
Indication Accuracy	*PV Type (on models with analog set point):* Nominally ±2% of deviation range. *Deviation Type (on models with digital set point):* Deviation Indication: Nominally ±5% of deviation range. Null Indication: Nominally ±1% of deviation range.
Common Mode Rejection Ratio	*T/C and mV Inputs:* 95 db minimum at 60 Hz with 1000 ohm imbalance.
Normal Mode Rejection Ratio	*T/C and mV Inputs:* 60 db minimum at 60 Hz; normal mode voltage 5 times span.

Design

Input	*Thermocouple:* Types E, J, K, R, S, T. *Resistance Temperature Detector:* 100-ohm platinum, two or three-wire. *Millivolts dc:* Ranges −5 to 5, 0 to 10, 10 to 50, and 0 to 50 mV. *Milliamperes dc:* 4 to 20 mA. *Wet/Dry Bulb Differential (RTD):* 0 to 16°C (0 to 60°F) differential. *Relative Humidity (Honeywell Composite Gold Grid Humidity Sensor):* 2 to 100% RH. *DewProbe (Honeywell Dew Point Sensor):* −40 to 72°C (−40 to 160°F).
Sensor Break Protection (All models except AV10 and AV020AA)	*Upscale Burnout:* Available on T/C, RTD, and mA inputs. *Downscale Burnout:* Available on T/C, mA, mV, and RH inputs.
Source Resistance Rating	*T/C and mV Ranges:* 1000 ohms maximum.
Minimum Input Span	*T/C and mV Ranges:* 5 mV.
Input Impedance	*T/C and mV Inputs:* 0.8 megohms minimum. *mA Input:* 10 ohms maximum.
Controlled Output	
AV10 and AV020AA	No output provided.
AV30, AV31	Basic on-off type output. *Primary:* SPDT electromechanical relay (optional SPST solid-state relay available). *Secondary (auxiliary):* SPDT electromechanical relay for deviation alarm, deviation auxiliary alarm, process alarm and process auxiliary alarm outputs. Two SPST electromechanical relays for dual deviation alarm output.
AV50 through AV57	Limit output with on-off output form (SPDT electromechanical relay)

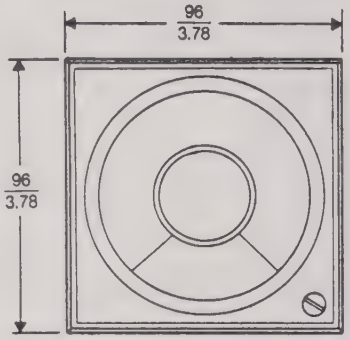
Specifications (Continued)

Controlled Output	
AV70 through AV73	Time proportioning output with on-off output form. *Primary:* SPDT electromechanical relay (optional SPST solid-state relay available). *Secondary (auxiliary):* SPDT electromechanical relay for deviation alarm, deviation auxiliary alarm, process alarm, process auxiliary alarm, and cooling outputs. Two SPST electromechanical relays for dual deviation alarm output.
AV90 through AV97	Current proportioning output. *Primary:* 4 to 20 mA into 650-ohm maximum load. *Secondary (auxiliary):* SPDT electromechanical relay for deviation alarm, deviation auxiliary alarm, process alarm, and process auxiliary alarm outputs. Two SPST electromechanical relays for dual deviation alarm output.
Relay Contact Ratings	*Primary* Electromechanical (SPDT). Resistive Load: 10 amps at 120 Vac; 5 amps at 240 Vac. Pilot Duty: 50 VA at 120 or 240 Vac. Optional Solid-State (SPST, N.O. contact). Resistive Load: 1.25 amps at 120 or 240 Vac. Pilot Duty: 150 VA at 120 or 240 Vac with "inrush" not to exceed 1050 VA; minimum load 0.1 amp. *Secondary (auxiliary functions except dual deviation)* Electromechanical (SPDT). Resistive Load: 5 amps at 120 Vac; 2.5 amps at 240 Vac. Pilot Duty: 50 VA at 120 or 240 Vac. *Secondary (auxiliary function; dual deviation alarm only)* Electromechanical (SPST). Resistive Load: 1 amp at 120 Vac; 0.5 amp at 240 Vac.
Primary Set Point	
Analog Type (All models except AV10 and AV020AA)	Circumferential ring on PV scale; adjustable to any point on 250°, 2.8-inch diameter scale.
Digital Type (AV30, AV70, AV72, AV90, AV92, AV94, AV96)	Any three-digit number in engineering units from 000 through 999; selectable by thumbwheel switches. (Four-digit number available on special orders.)
Primary Set Point Resolution	*Analog Type:* 0.2% maximum for set point units. *Digital Type:* 1 engineering unit.
Remote Set Point (AV020AA only)	*Type of set point:* Analog (potentiometric) *Adjustment:* Circumferential ring on range scale; adjustable to any point on 250°, 2.8-inch diameter scale. *Total resistance:* 1140 ohms ±10%. *Effective resistance for 0 to 100% of dial setting:* 1000 ohms ±10%.
Process Alarm Set Point (AV30, AV31, AV70 through AV73, AV90 through AV97)	Available only on models having PV scale. Knob on PV scale that allows set point of process alarm to be adjusted independently from the primary set point.
Process Alarm Set Point Resolution (AV30, AV31, AV70 through AV73, AV90 through AV97)	0.4% maximum for set point units.
Indicator	
Process Variable Type (All indicating models)	250° meter provides full scale indication of process variable
Deviation Type (AV30, AV70, AV72, AV90, AV92, AV94, AV96)	Vertical-scale meter with incremental markings from 50–0–50 for reading PV deviation from set point. Null position is at center (0)
Proportional Band Adjustment (AV70 through AV73, AV90 through AV97)*	Selectable at 2, 5, or 10% of span. *Heat-cool models have dual proportional band adjustments

Specifications (continued)

Cycle Time Adjustment (AV70 through AV73)*	Selectable at 10 or 20 seconds. *Heat-cool models have dual cycle time adjustments.
Manual Reset Adjustment (AV70, AV90, AV94)	Adjustable over full maximum proportional band for elimination of offset from output.
Auto Reset Adjustment (Repeats/Minute) (AV72, AV73, AV92, AV93, AV96, AV97)	Selectable at 0, 0.1, or 0.5 repeats/minute.
Derivative Adjustment (Rate Time) (AV72, AV73, AV92, AV93, AV96, AV97)	Selectable at 0, 0.5, or 2 minutes.
Deviation Alarm Adjustment (AV30, AV31, AV70 through AV73, AV90 through AV97)	Auxiliary control function; adjustable from −10 to +10% of span from primary set point.
Deviation Auxiliary Alarm Adjustment (AV30, AV31, AV70 through AV73, AV90 through AV97)	Auxiliary control function; adjustable from −10 to +10% of span from primary set point.
Dual Deviation Alarm Adjustment (AV30, AV31, AV70 through AV73, AV90 through AV97)	Auxiliary control function; dual control that is adjustable from 1 to 20% of span above primary set point for high alarm, and from 1 to 20% of span below primary set point for low alarm.
Dead Band Adjustment (AV70 through AV73)	Auxiliary control function; adjusts heat-cool dead band from 0 to 1% of span.
Manual Reset Pushbutton (AV50 through AV57)	Pushbutton for manually resetting output relay after process variable has returned to within limit range.
Instrument Power Light (AV31, AV51, AV53, AV55, AV57, AV71, AV73, AV91, AV93, AV95, AV97)	Non-indicating type models only. Amber indicator for instrument operating power.
Operating Light (All models except AV10 and AV020AA)	Green indicator for primary output; indicates when primary output relay is energized. (On heat-cool models, primary output is used for heating circuit, and auxiliary output is used for cooling circuit.)
Alarm Light	Optional red indicator for auxiliary functions. *For Deviation Alarm or Process Alarm:* Indicates when alarm condition exists (i.e., auxiliary relay is de-energized). *For Deviation Auxiliary Alarm or Process Auxiliary Alarm:* Indicates during non-alarm state, and turns off when alarm condition exists (i.e., auxiliary relay is de-energized). *For Dual Deviation Alarm:* Indicates when either high or low alarm condition exists (i.e., either high or low alarm relay is de-energized). On heat-cool models, indicates when auxiliary relay is energized to activate the cooling circuit.
Approval Bodies	All controller models UL listed and CSA approved. All limit controllers FM approved.
Connections	No. 6-32 screw terminals on rear of instrument case. Optional terminal enclosure is available.
Dimensions*	*Front Bezel:* 1/4 DIN outline – 96 x 96 mm (3.78 x 3.78 in). *Panel Cutout:* 1/4 DIN dimension – 92 x 92 mm (3.62 x 3.62 in). *Depth Behind Panel:* 182.2 mm (7.2 in). *Refer to Figures 5, 6 and 7 for further details.
Weight	*Net:* Approximately 1,3 kg (3 lb). *Shipping:* Approximately 1,6 kg (3.5 lb).

Dimensions: millimetres / inches



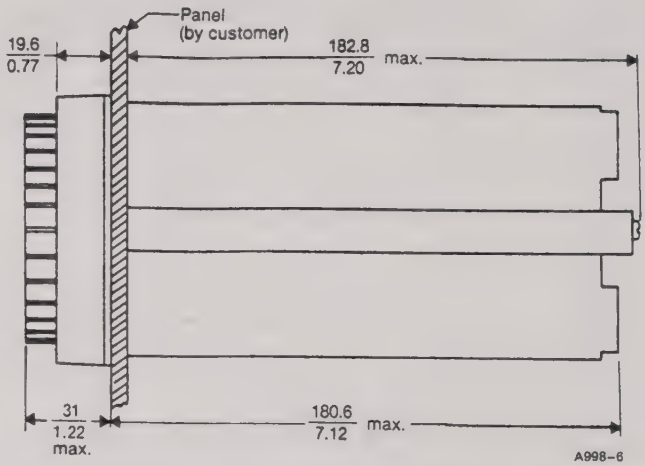
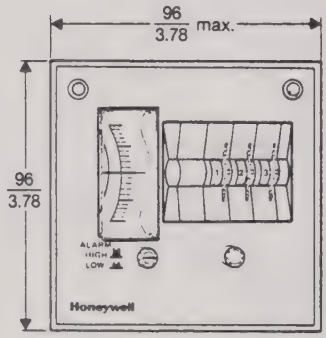


Figure 5 — Dimensions, Dialapak Controller with PV Type Indicator



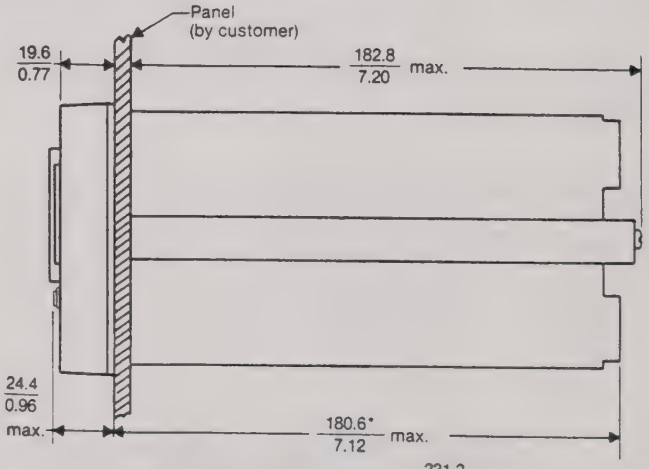


Figure 6 — Dimensions, Dialapak Controller with Deviation Type Indicator (Digital Set Point)

*Dimension with optional terminal box 231.2 / 9.1 max.

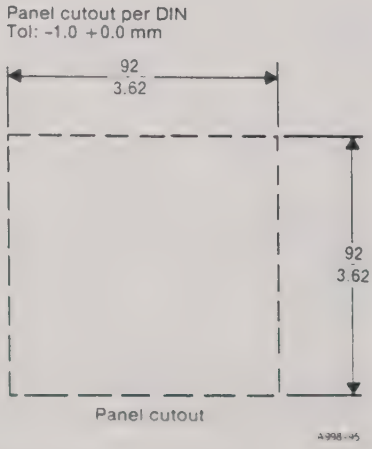


Figure 7 — Cutout Dimensions

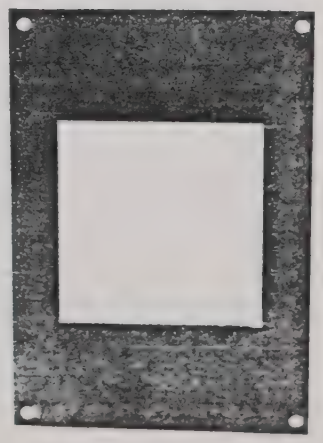


Figure 8 — Adapter Plate

TABLE 3 — Adaptor Plates

Adapter Part No.	Adapter Size W x H	To Cover Cutouts Up to W x H
24400104–001	5-1/4 x 8-7/8 in. (133 x 225 mm)	4-1/2 x 8-1/8 in. (114 x 206 mm)
24400104–002	5-3/8 x 7-1/2 in. (137 x 190 mm)	4-5/8 x 6-3/4 in. (117 x 171 mm)
24400104–003	8-1/4 x 7-1/4 in. (210 x 184 mm)	7-1/2 x 6-1/2 in. (190 x 165 mm)
24400104–004	8-3/8 x 8-7/8 in. (213 x 225 mm)	7-5/8 x 8-1/8 in. (194 x 206 mm)
24400104–005	9-7/8 x 10-7/8 in. (250 x 276 mm)	9-1/8 x 10-1/8 in. (231 x 257 mm)

Accessories

Adapter Plate

An adapter plate (Figure 8) covers non-1/4 DIN panel cutouts. See Table 3 for the available sizes and respective part numbers. All adapter plates are supplied complete with mounting hardware.

Surface Mounting Bracket

A surface mounting bracket (Figure 9) is used for mounting a Dialapak controller to a wall or to the process equipment. For this mounting bracket, specify Part No. 24400071-001.

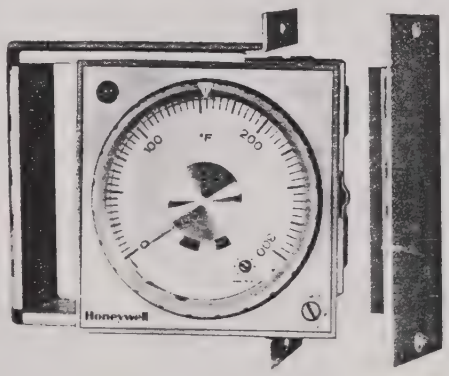


Figure 9 — Surface Mounting Bracket

Terminal Box Assembly

A terminal box assembly (Figure 10) is used for installations in which the electrical terminals must be covered or conduit wiring is required. For this terminal box, specify Part No. 24400072-001.

Local/Remote Set Point Calibration Boards

The standard 100 per cent set point input signal to a Dialapak controller is between 1.8 and 2.0 Vdc. Calibration boards, which attach to the rear terminals of the instrument, adapt a particular remote set point signal to this voltage requirement. The calibration boards are as follows:

1. Part No. 24400123–001: For a current input (4 to 20 mA).
2. Part No. 24400123–002: For a voltage input (0 to 2 Vdc or 0 to 5 Vdc). (NOTE: The 0 to 2 Vdc remote set point circuit can be used without the calibration board if the set point signal source is equipped with a calibration adjustment.)
3. Part No. 24400123–003: For a potentiometer input (1000 ohms)

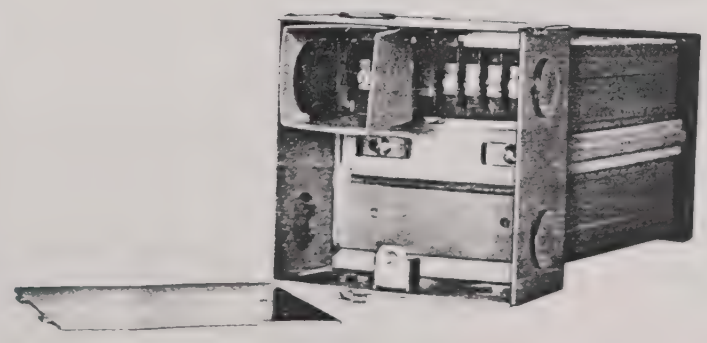


Figure 10 — Terminal Box Assembly

Protective Cover

A transparent snap-on cover (Figure 11) protects the face of the Dialapak controller from splash and dust conditions. For this cover, specify Part No. 24400107-001. For further information, see Product Data sheet for Dialapak Splash and Dust Resistant Covers, Reference 90-1075.

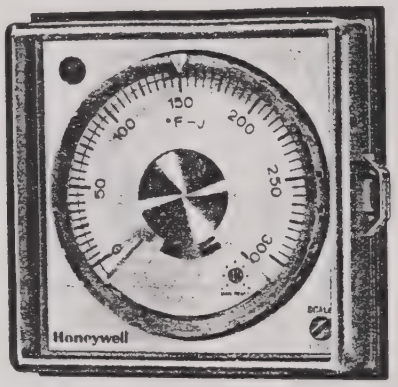


Figure 11 — Protective Cover

Six-Position Selector Switches

Two-pole, six-position, rotary switches (Figure 12) monitor as many as six sensors with a single Dialapak Indicator Model AV10. These switches are prewired for use with specific types of sensors. See Table 4 for the available selector switches and the respective model numbers. For further information, see Instruction sheet for Six-Position Selector Switches, Instruction 95–8203.

Ordering Information

Select basic model number and auxiliary control function from Tables 1 and 2, respectively, in this publication. For complete ordering information, request the following model selection guide: Publication 011–307, Model Selection Guide for Dialapak Indicator/Controller.

For more information:
Contact your nearest Honeywell Branch Office or
Honeywell Inc.
1100 Virginia Drive,
Fort Washington, Pa. 19034.

In Canada,
Honeywell Limited,
155 Gordon Baker Road
Willowdale, Ontario M2H 3N7.

Specifications are subject to change without notice.

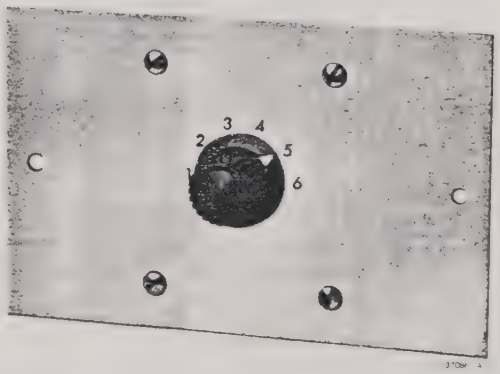


Figure 12 — Six-Position Selector Switch

TABLE 4 — Six-Position Selector Switches

Model No.	Sensor Used With
137086AA	Type J Thermocouple
137086AB	Type K or T Thermocouple
137086AC	Resistance Temperature Detector or Millivolt

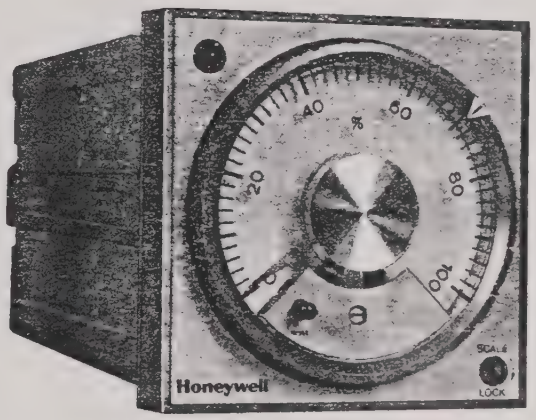
Dialapak — High and Low Limit Controllers

Technical Data

Models AV50, AV51, AV52, AV53, AV54
AV55, AV56, and AV57

Introduction

The Dialapak Limit Controllers, Models AV50 through AV57 (Figure 1), are miniaturized, solid state instruments that provide high or low limit cutoff functions for a variety of industrial process systems. The different controller models listed in Table 1 provide a variety of limit, control, indicating, and reset capabilities.



A998—117

Figure 1 — Typical High or Low Limit Controller

TABLE 1 — Dialapak Limit Controllers

	Control		Indication		Reset	
Model	**High Limit**	**Low Limit**	**PV Indicator**	**Non-Indicating**	**Man Only***	**Man Plus Auto****
AV50	•		•		•	
AV51	•			•	•	
AV52		•	•		•	
AV53		•		•	•	
AV54	•		•			•
AV55	•			•		•
AV56		•	•			•
AV57		•		•		•

*Manual reset required after power interruption and when process variable is out of limits
**Manual reset not required after power interruption except when process variable is out of limits

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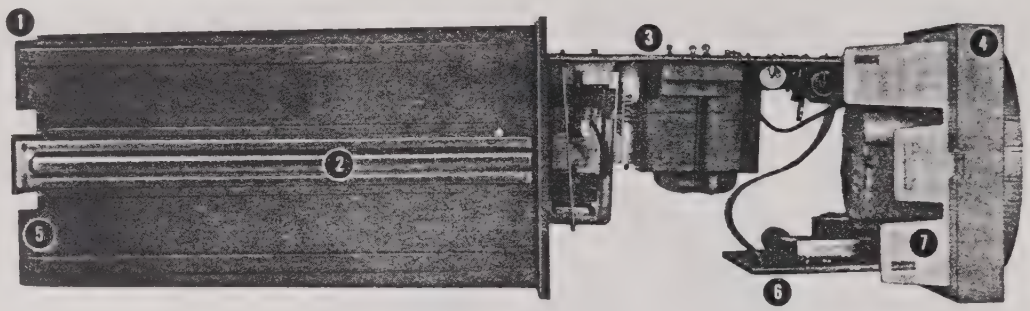
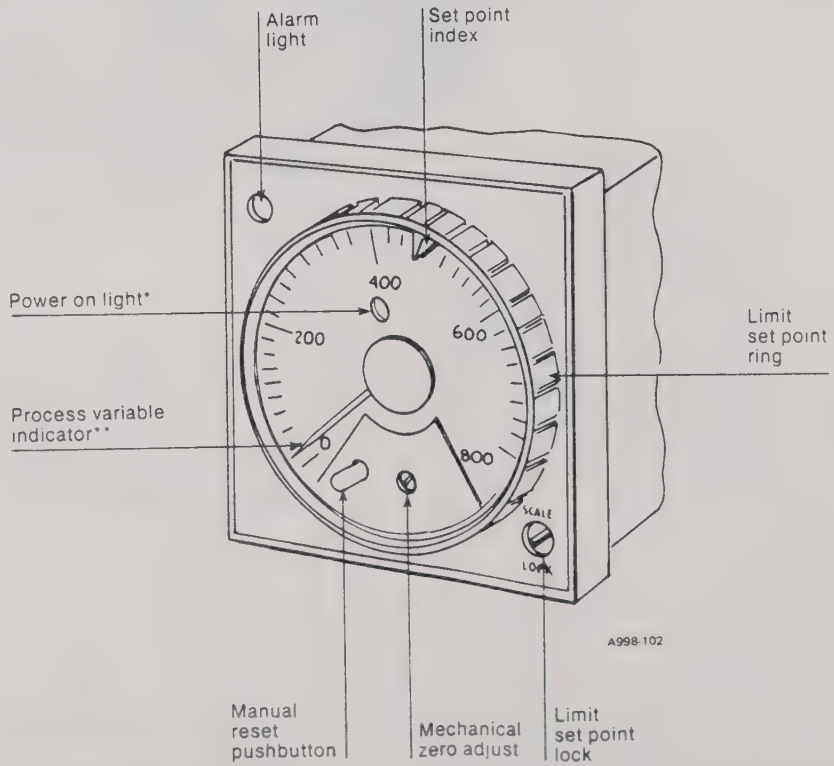


LEGEND

A998-118

① Field terminals
② Mounting bracket
③ Upper printed wiring board
④ Front assembly
⑤ Case
⑥ Lower printed wiring board
⑦ Plug-in chassis

Figure 2 — Case and Plug-in Chassis



*On non-indicating models only
**On indicating models only.

Figure 3 — Front Assembly of Limit Controllers

General Description

The Dialapak Limit controllers consist of two primary assemblies: the case and the plug-in chassis. The molded plastic case assembly houses the plug-in chassis and provides terminals for field wiring connections. A U-shaped bracket around the case allows the instrument to be panel mounted. The plug-in chassis consists of a front assembly and two printed wiring boards. (See Figure 2.)

Front Assembly

The front assembly (Figure 3) contains various instrument operation components, depending upon the particular model.

Controller Models AV50, AV52, AV54 and AV56

The front assemblies of these models contain a circular-scale, process variable indicator; a mechanical zero adjustment for the indicator; a limit set point ring; a limit set point lock; a manual reset pushbutton; and an alarm light.

Controller Models AV51, AV53, AV55 and AV57

The front assemblies of these models contain the same components as the other models except that they have a power "ON" light, and a circular range scale only instead of the process variable indicator.

Printed Wiring Boards

The printed wiring boards snap-fit into the rear of the front assembly in an upper and lower configuration (Figure 2), and are electrically connected through post and receptacle connections. The upper board contains the power supply, input signal conditioner, preamplifier, differential amplifier and output circuits. The lower board contains the manual reset and optional remote reset circuits. These boards plug into receptacles in the rear of the case for electrical connection with the field wiring.

Operating Principles

Dialapak limit controllers are tailored to accept input signals from any of several types of external sensors and condition these signals as necessary to derive equivalent process variable (PV) signals to drive various circuits in the particular instruments. The limit controllers accept signals from such sources as thermocouples (T/Cs), resistance temperature detectors (RTDs), milliamperes dc, millivolts dc, wet bulb/dry bulb, Honeywell gold grid humidity sensors, or Honeywell dew probe sensors.

The equivalent PV signal is compared with the limit set point and any error (difference) de-energizes a limit output relay to manipulate the controlled variable accordingly. When de-energized, the output relay locks out and remains in this state until the PV input signal drops below the high limit set point or rises above the low limit set point, and the instrument is reset manually from the front or from a remote location.

Functional Circuits (Figure 4)

The limit controllers consist of a power supply, a signal conditioner, a preamplifier, a limit set point circuit, a differential amplifier, a limit output circuit, and a manual reset circuit. In models AV50, AV52, AV54 and AV56, the circuitry also includes a PV indicator. The limit controllers may also include a remote reset circuit on an optional basis.

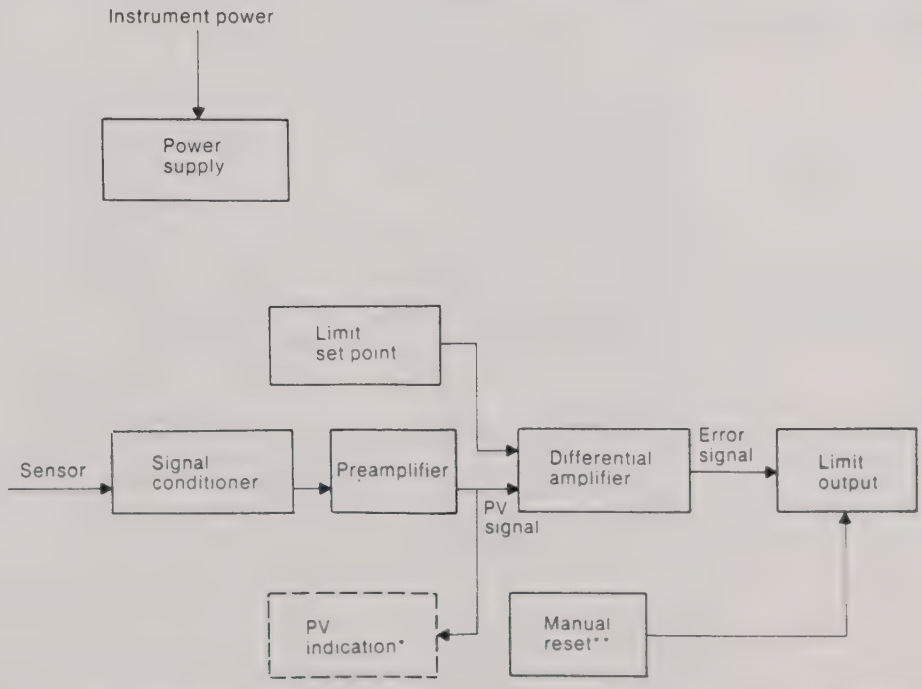


Figure 4 — Functional Block Diagram, Limit Controllers

Circuit Descriptions

Power Supply

At the power supply, the power transformer steps down the line voltage, which is then rectified and filtered to provide unregulated ±24 Vdc. Additional power supply circuitry then uses this unregulated ±24 Vdc to develop regulated +12 Vdc and −12 Vdc for other functional circuits in the instrument. (On models AV51, AV53, AV55 and AV57, the unregulated +24 Vdc is also used to light an amber LED for instrument power indication.)

Signal Conditioner

The input conditioning circuit accepts the input signal from the particular type of sensor and conditions it as necessary for use at the preamplifier. Descriptions of the conditioning circuits for the various types of sensors are:

T/C Inputs

Reference junction compensation is obtained with a voltage developed across a resistor having a high positive temperature coefficient of resistance. The T/C input voltage is added to the compensator voltage and then routed to the preamplifier.

RTD and DewProbe Inputs

Sensor signals are converted into mV signals by a network that also provides sensor leadwire resistance compensation. These mV signals are then routed to the preamplifier.

MA Inputs

The mA signals are converted into mV signals through a precision low temperature coefficient resistor, and then routed to the preamplifier.

MV and Voltage Inputs

Most mV input signals require no input conditioning; they are routed directly to the preamplifier. However, for 100 mV and voltage inputs, a divider network is provided to condition the input signal to an appropriate level.

Wet Bulb/Dry Bulb Inputs

The differential RTD input signals are converted into ground referenced, single ended mV signals by a bridge circuit and a differential amplifier. These mV signals are then routed to the preamplifier.

Relative Humidity Inputs

The input signals from the gold grid humidity sensor are converted into ground referenced, single ended mV signals which are then routed to the preamplifier.

Preamplifier

The preamplifier circuit converts the conditioned input signal into an equivalent PV signal. This circuit also includes appropriate means for providing related functions such as input protection and filtering, and sensor break protection. The equivalent PV signal developed by this circuit is routed to the PV indicator (models AV50, AV52, AV54 and AV56 only) and to the differential amplifier.

PV Indicator

The PV indicator circuit uses the output signal from the preamplifier to drive the meter to a scale position that corresponds to the level of the applied signal. Factory trimmed resistors are provided in this circuit for calibrating the low and high ends of the meter. The PV indicator is provided only on models AV50, AV52, AV54 and AV56.

Limit Set Point

Depending upon the model, the limit set point is established by the set point ring around the PV indicator or the range scale. A voltage corresponding to the set point span is applied across the set point potentiometer. The wiper of the set point potentiometer, which is adjusted by the set point ring, allows a variable voltage to be applied to the differential amplifier as a second input.

Differential Amplifier

The differential amplifier compares the limit set point voltage and the equivalent PV sigal from the preamplifier with appropriate scaling factors. Any difference from the signal comparison results in an error signal which is routed to the limit output circuit.

Limit Output

The limit output uses the error signal from the differential amplifier to apply the operating voltage to the coil of an electromechanical, single-pole double-throw (SPDT) output relay. The N.O. and N.C. contacts of the output relay terminate at the rear of the instrument for appropriate field wiring connections. A red LED in the coil circuit indicates the status of the output relay.

In the high limit controller, when the PV input signal is below the limit set point, the differential amplifier provides a positive error signal that energizes the output relay and turns off the red LED. If the PV signal exceeds the limit set point, the output relay de-energizes, and the red LED turns on. The output relay locks out when de-energized, and cannot be energized again until the PV signal returns to a value within limits and the instrument is manually reset.

Instruments may also require manually resetting after power interruptions. In controller models having manual reset only, the output circuit is wired so that the output relay locks out when line power is removed from the instrument, which means the instrument must be manually reset upon restoration of power to unlock the output relay. In controller models having manual plus automatic reset, the output circuit is wired so that the output relay locks out upon power removal only when the process is in an out-of-limit state. These reset functions are protective features for the process.

The output circuit in the low limit controller is similar to the one for the high limit controller except that the output relay operates under the reverse conditions. The output relay in the low limit controller is energized when the PV input signal is above the limit set point, and is de-engerzied when the PV signal drops below the set point. The red LED turns on when the output relay de-energizes, indicating that the PV input signal is below the limit set point.

Remote Reset (Optional)

This option allows the instrument to be reset manually from a remote location by manipulation of a momentary-type switch. The remote reset switch is connected to rear terminals on the instrument that bypass the local reset pushbutton circuit. (NOTE: The local reset pushbutton remains in the circuit unless it is mechanically disconnected or removed.)

Dialapak Controllers
All Models

Installation

Introduction
Dialapak controllers monitor and control temperatures for various industrial process systems. See Specification 45-02-03-03 for detailed information regarding the different types of controllers available. This section provides installation information for the Dialapak instruments listed in Table 1.

Unpacking
After carefully unpacking the Dialapak instrument, inspect it for shipping damages. Report any damages to the carrier immediately.

The Dialapak instrument is shipped as a complete unit and only needs to be mounted and wired for operation. (Appropriate startup and tuning procedures are contained in the separate Operating Data section.)

Mounting
Select the mounting location for the instrument. The instrument can be mounted in any position or at any angle. The operating conditions (ambient temperature, relative humidity, and vibration) must be within the specification limits for the Dialapak controllers.

Figure 1 shows the overall dimensional requirements for the Dialapak instruments. If the instrument is to be panel-mounted, cut out the mounting hole according to the dimensions shown in Figure 2. Mount the instrument using the supplied U-shaped metal bracket.

Accessories listed below are available to meet varying installation requirements. See specifications for the Dialapak controllers for more details.

1. Adapter plates allow the instrument to be mounted in existing panel cutouts of various sizes.
2. Surface mounting bracket allows the instrument to be mounted on a wall or to the process equipment.
3. Terminal box assembly allows the instrument to be used in locations where the electrical terminals must be covered or conduit wiring is required.
4. Transparent snap-on splash cover protects and seals the face of the instrument.

TABLE 1 — Dialapak Controllers

Basic Model	Controller Type	Indication With	Indication Without
AV10	Indicator Only	•	
AV30	On-Off	•	
AV31	On-Off		•
AV50	High Limit*	•	
AV51	High Limit*		•
AV52	Low Limit*	•	
AV53	Low Limit*		•
AV54	High Limit**	•	
AV55	High Limit**		•
AV56	Low Limit**	•	
AV57	Low Limit**		•
AV70	One-Mode Time Proportioning†	•	
AV71	One-Mode Time Proportioning†		•
AV72	Three-Mode Time Proportioning†	•	
AV73	Three-Mode Time Proportioning†		•
AV90	One-Mode Current Proportioning†	•	
AV91	One-Mode Current Proportioning†		•
AV92	Three-Mode Current Proportioning†	•	
AV93	Three-Mode Current Proportioning†		•
AV94	One-Mode Current Proportioning††	•	
AV95	One-Mode Current Proportioning††		•
AV96	Three-Mode Current Proportioning††	•	
AV97	Three-Mode Current Proportioning††		•

* Manual reset required after power interruption.
** Automatically reset after power interruption.
† Reverse type output.
†† Direct type output.

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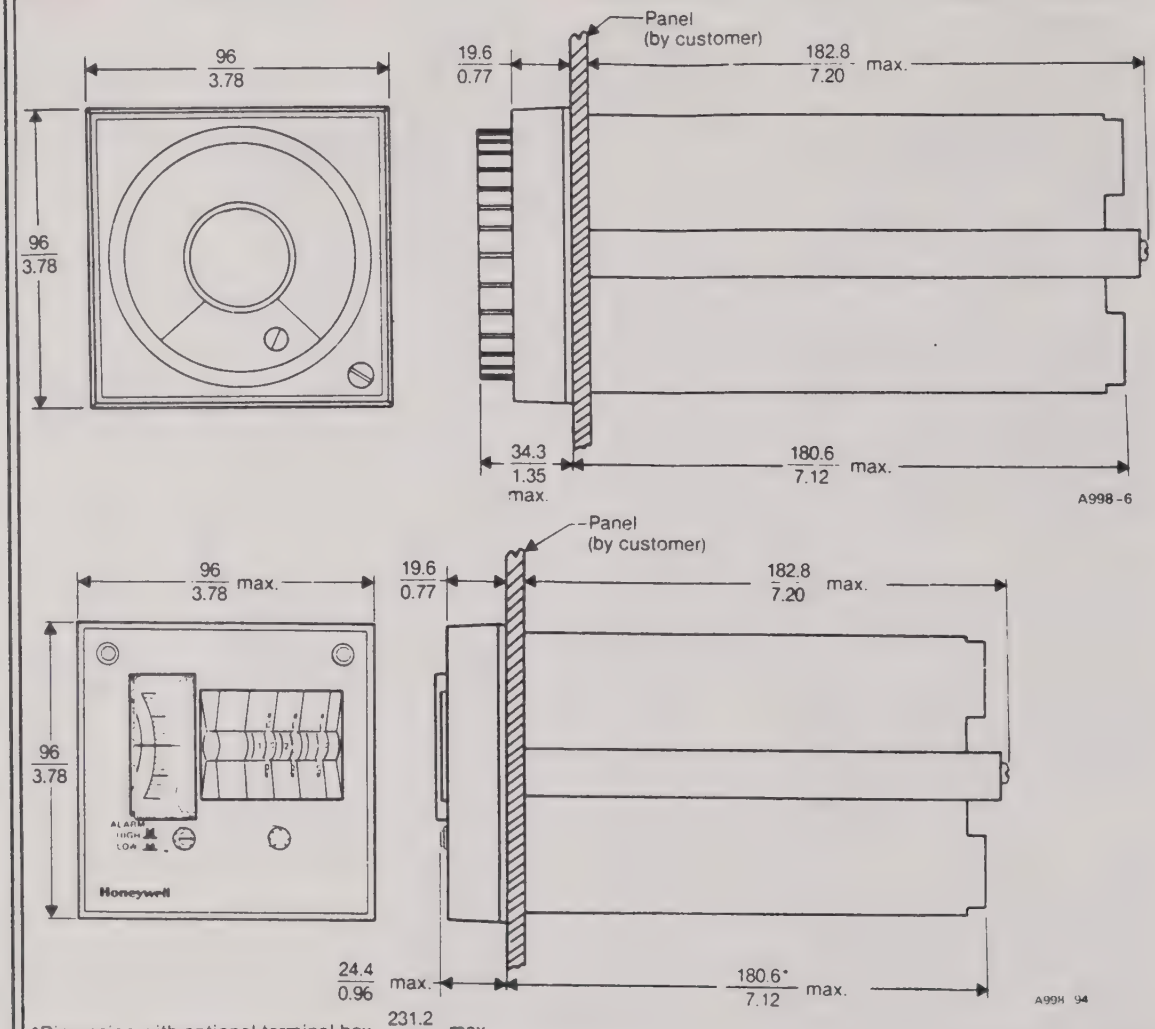


Figure 1 – Overall Dimensional Requirements for Dialapak Controllers

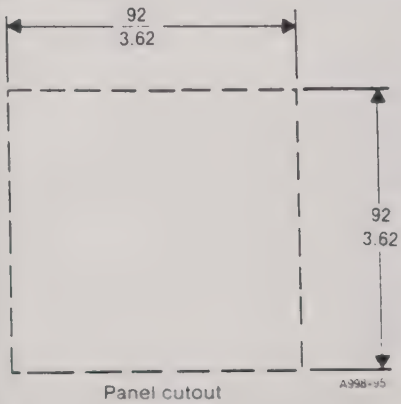


Figure 2 – Panel Cutout Dimensions

Wiring

Typical wiring connections for the Dialapak instruments are shown in Figures 3 through 7. Figure 3 shows the required connections for Indicator Model AV10; Figure 4 shows the required connections for controller models AV50 through AV57; Figure 5 shows the required connections for controller models AV30, AV31 and AV70 through AV73; Figure 6 shows the required connections for controller models AV70 through AV73 with heat-cool output; and Figure 7 shows the required connections for controller models AV90 through AV97. These illustrations include the wiring connections for the various options except the local/remote set point. Refer to the paragraph entitled Optional Local/Remote Set Point for appropriate wiring information when this option is included. Wire the instrument as required using the appropriate connection diagram.

NOTE: All wiring must comply with local codes, regulations, and ordinances.

Do not run sensor or low voltage leadwires in a conduit with the power line wiring. Observe polarity when connecting thermocouple leadwires. On Honeywell supplied thermocouple leadwires, the negative (—) leadwire always has red insulation. With 2-wire RTD input, minimize leadwire resistance since it adds directly to sensor resistance and connect a jumper between terminals 2 and 3. With 3-wire RTD sensor, make resistance of all three leadwires equal for optimum compensation. Refer to the specifications for the Dialapak controllers for the source resistance and input impedance limitations.

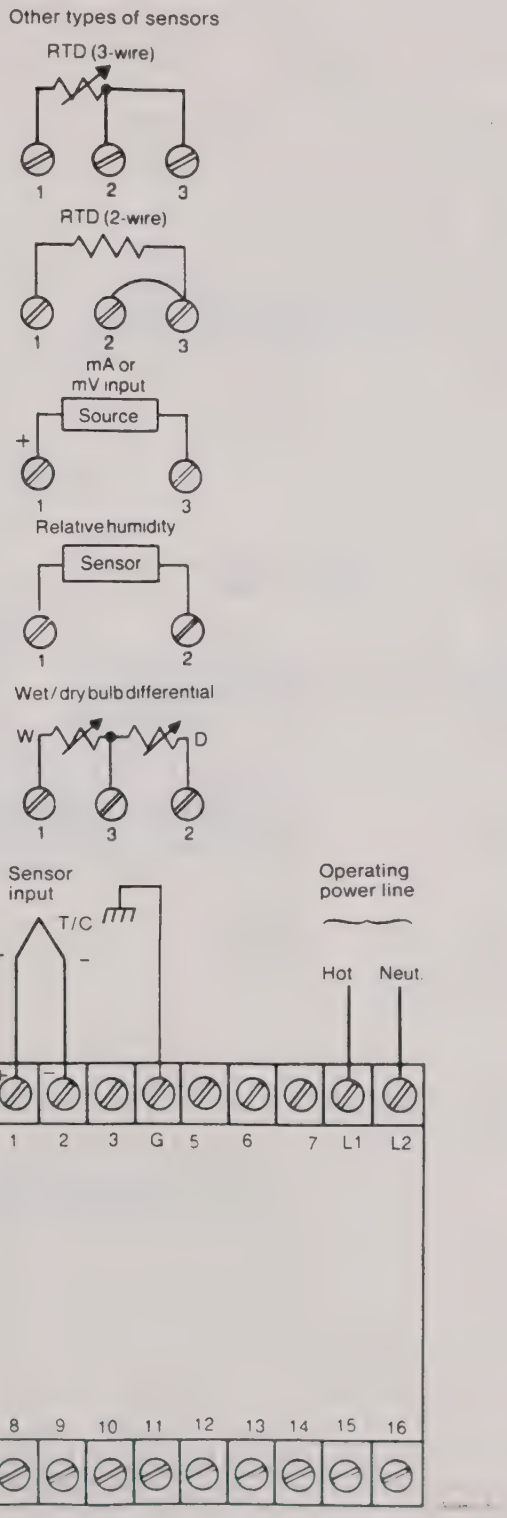


Figure 3 – Typical Wiring Connections for Indicator Model AV10

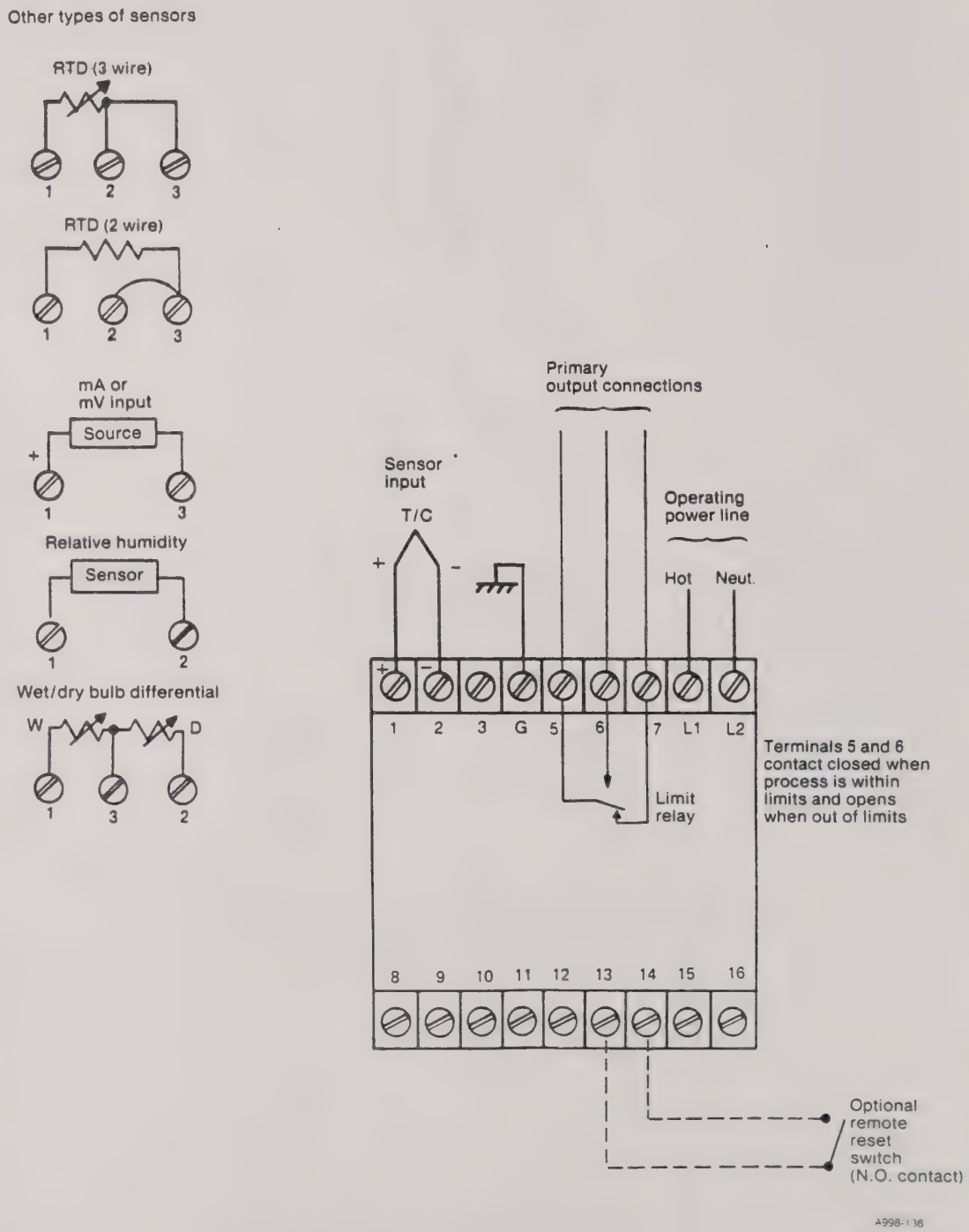


Figure 4 – Typical Wiring Connections for Controller Models AV50 through AV57

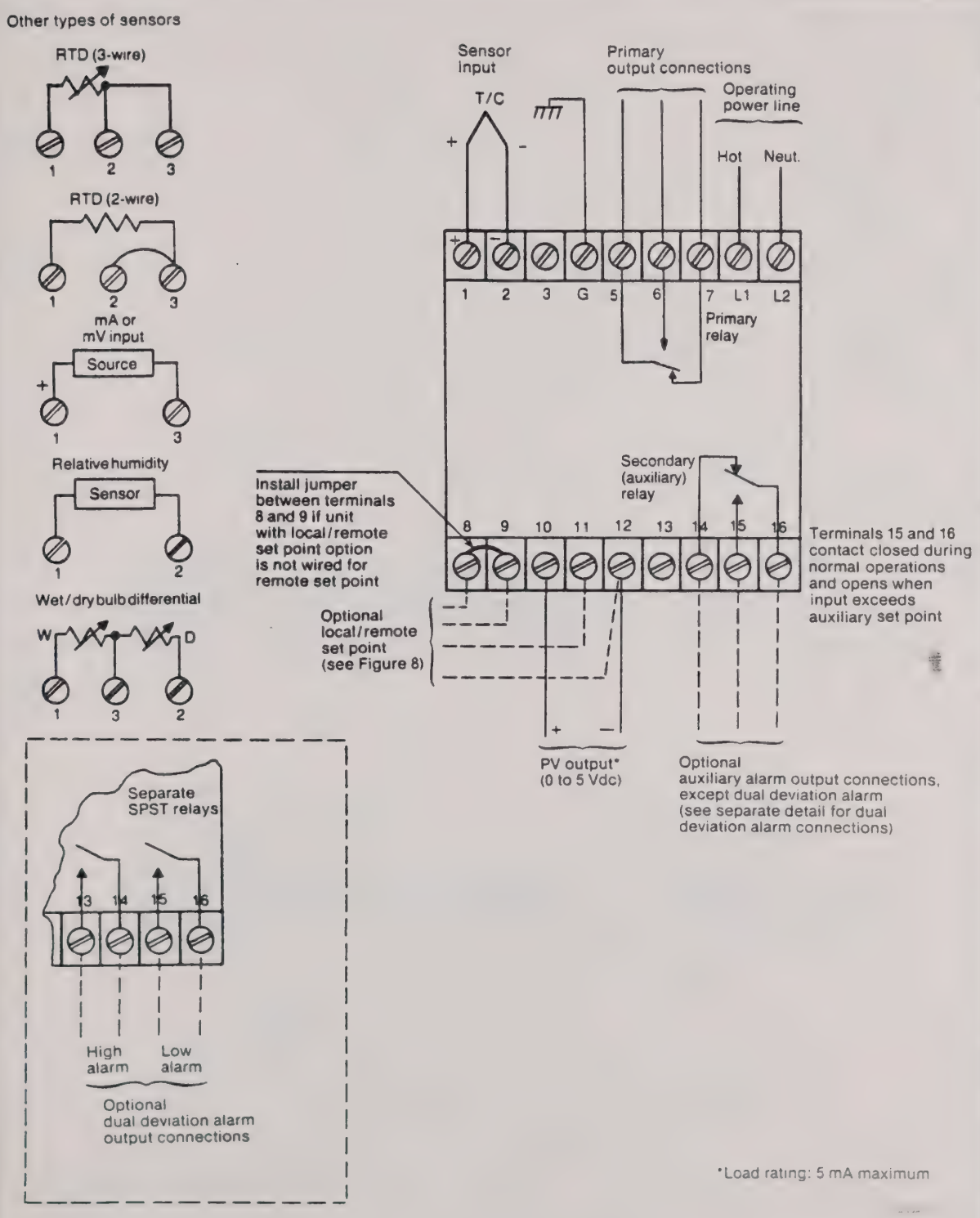

Other types of sensors
RTD (3-wire)
1 2 3
RTD (2-wire)
1 2 3
mA or mV input
Source
+
1 3
Relative humidity
Sensor
1 2
Wet/dry bulb differential
W D
1 3 2
Sensor Input
T/C
+ –
Primary output connections
Operating power line
Hot Neut.
1 2 3 G 5 6 7 L1 L2
Primary relay
Secondary (auxiliary) relay
Install jumper between terminals 8 and 9 if unit with local/remote set point option is not wired for remote set point
8 9 10 11 12 13 14 15 16
Terminals 15 and 16 contact closed during normal operations and opens when input exceeds auxiliary set point
Optional local/remote set point (see Figure 8)
PV output* (0 to 5 Vdc)
Optional auxiliary alarm output connections, except dual deviation alarm (see separate detail for dual deviation alarm connections)
Separate SPST relays
13 14 15 16
High alarm
Low alarm
Optional dual deviation alarm output connections
*Load rating: 5 mA maximum

Figure 5 – Typical Wiring Connections for Controller Models AV30, AV31 and Models AV70 through AV73

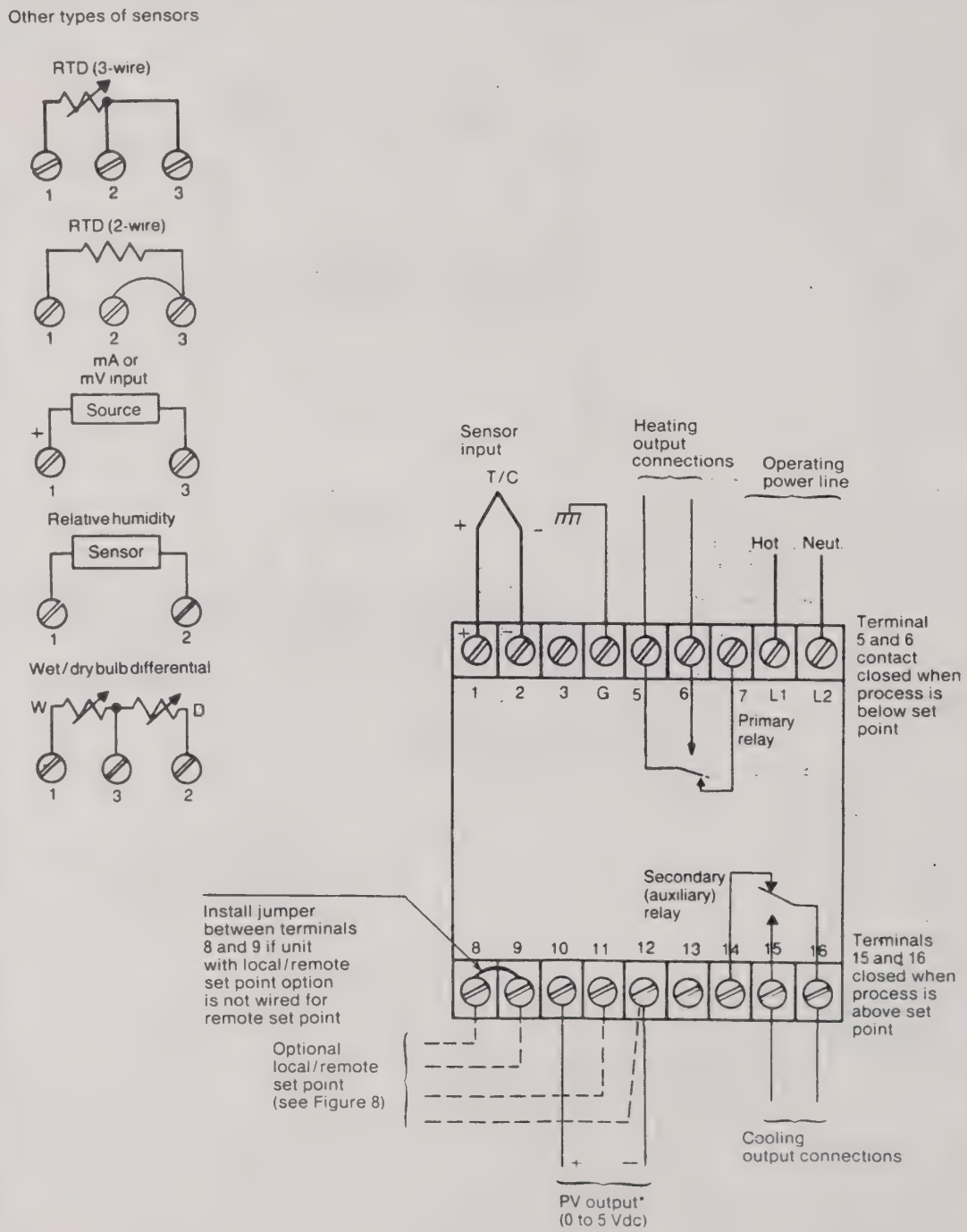


Figure 6 – Typical Wiring Connections for Controller with Heat-Cool Outputs. Models AV70 through AV73

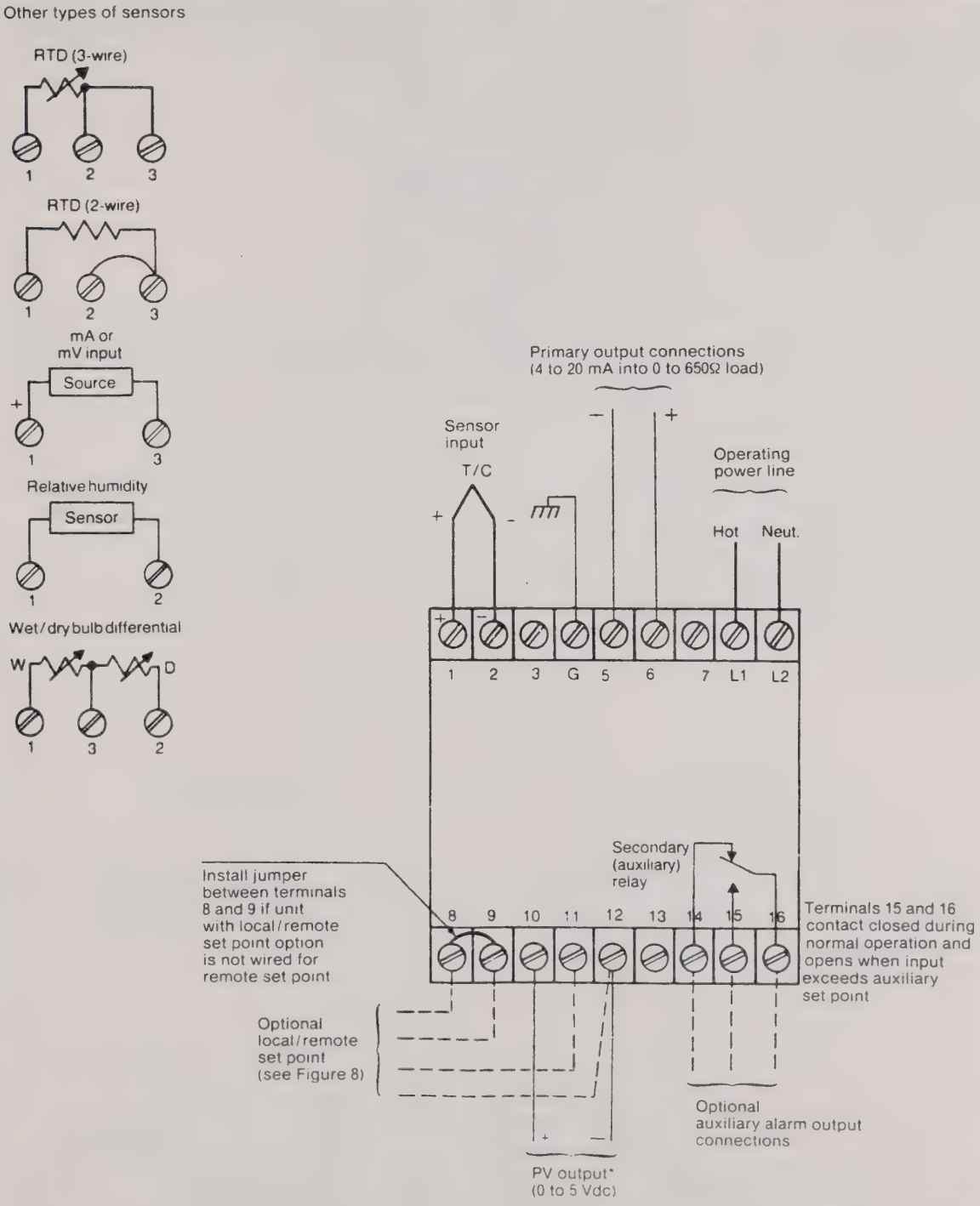


Figure 7 – Typical Wiring Connections for Controller Models AV90 through AV97

Optional Local/Remote Set Point

The local/remote set point option allows the primary set point to be adjusted either from the instrument (local) or from a remote source. This option requires the use of an external SPDT selector switch, a calibration board, and a remote set point source. These components are wired in an external circuit and connected to rear terminals on the instrument. The particular calibration board used depends on the type of means used to provide the remote set point. Three calibration boards are available:

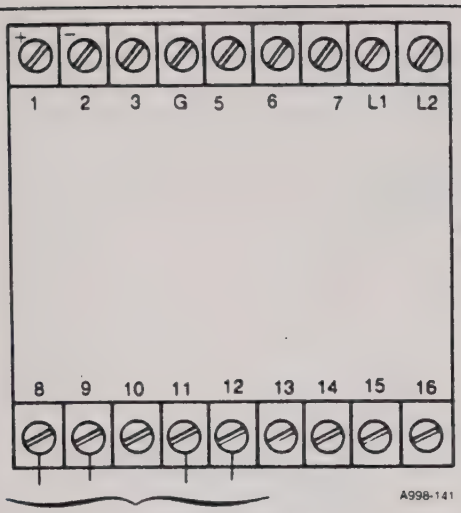
1. Calibration board No. 24400123-001: For current inputs (4 to 20 mA)
2. Calibration board No. 24400123-002: For voltage inpute (0 to 2 Bdc or 0 to 5 Vdc)

   NOTE: A jumper must be cut in the calibration board when the 0 to 5 Vdc input is used.

   NOTE: The 0 to 2 Vdc remote set point circuit can be used without the calibration board if the set point source is equipped with an adjustment that will provide a calibrated output of 2.0 Vdc.
3. Calibration board No. 24400123-003: For inputs from a potentiometer (1000 ohms) or the Dialapak Set Point Assembly.

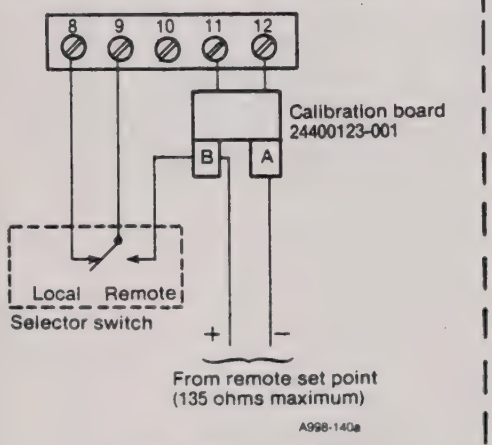
Wiring

Figure 8 shows the wiring connections required to install the components in the various types of local/remote set point circuits. Wire the circuit using the appropriate diagram shown in this illustration. The calibration boards are equipped with spade lugs to facilitate their installation under terminals 11 and 12 on the rear of the instrument. Install the selector switch at a location convenient to the operator. Since the remote set point is low level, the contacts of the local/remote selector switch should be made of gold or some other material that is suitable for dry circuit operation. Observe good wiring practices normally used for low level signals. Keep remote set point wiring separated from power wiring; in some locations, shielded cable may be required depending on wiring length and interference level in the area.

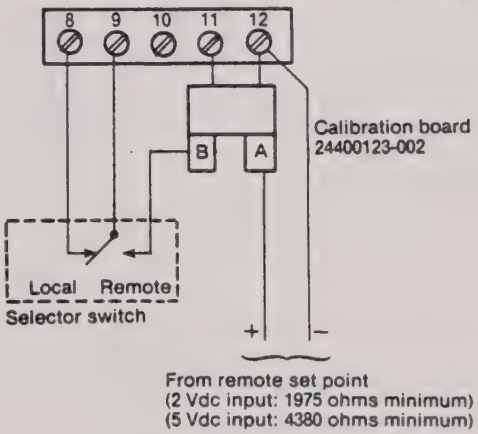


Rear terminals on typical instrument

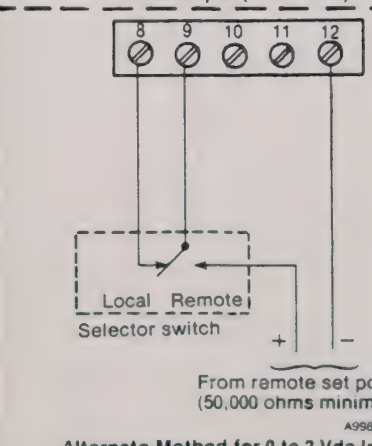
Local/remote set point connections



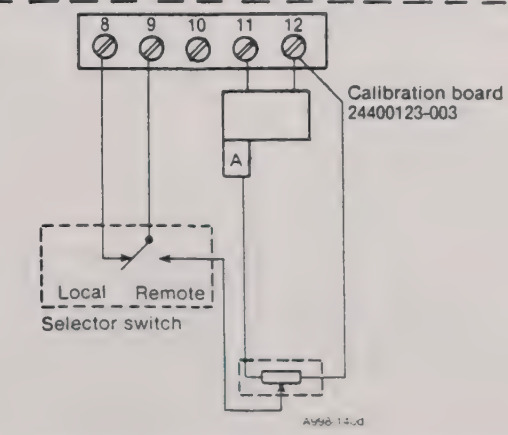
Current Input (4 to 20 mA)



Voltage Input (0 to 2 Vdc or 0 to 5 Vdc)



Alternate Method for 0 to 2 Vdc Input (Without Using Calibration Board)



Remote Set Point Using Potentiometer (1000 ohms)

Figure 8 – Wiring Connections for Various Local/Remote Set Point Circuits

Calibration

The standard 100% remote set point input required at the instrument is between 1.8 and 2 0 Vdc. The calibration board adapts the remote set point signal and allows it to be accurately trimmed to obtain the required input voltage. After the local/remote set point circuit has be installed, it must be calibrated to provide the proper voltage to the instrument. Calibration is accomplished for the various local/remote set point circuits by using one of the methods described below, as appropriate.

Calibration of Current Type Remote Set Point Circuit (Figure 9)

1. Remove plug-in chassis from case and clip out resistor R286 (R276 on heat-cool models) on instrument's lower printed wiring board. Reinstall chassis in case.
2. Turn on operating power to instrument.
3. Set local/remote selector switch to local mode.
4. Adjust local set point to 0% setting. Measure and record voltage across terminals 9 (+) and 12 (−) at rear of instrument. (It will be approximately 0 Vdc.) Then, adjust locat set point to 100% setting, and repeat voltage measurement acress terminals 9 and 12. (The voltage will be approximately 2 Vdc.)
5. Set local/remote selector switch to remote mode.
6. Adjust P2 on calibration board to the mid position.
7. Adjust remote set point source to apply a 4 mA input signal to terminals B (+) and A (−) on calibration board. Then, adjust P1 on calibration board until voltage across terminals 9 and 12 on rear of instrument is equal to that obtained for 0% setting in step 4 above
8. Adjust remote set point source to apply a 20 mA input signal to terminals B and A on calibration board. Then, adjust P2 on calibration board until voltage across terminals 9 and 12 on rear of instrument is equal to that obtained for the 100% setting in step 4 above
9. Repeat steps 7 and 8 as necessary until proper readings are obtained.

Calibration of Voltage Type Remote Set Point Circuit (Figure 10)

1. Turn on operating power to instrument
2. Set local/remote selector switch to local mode
3. Adjust local set point to 100% setting. Measure and record voltage across terminals 9 (+) and 12 (−) at rear of instrument. (It will be approximately 2 Vdc.)
4. Set local/remote selector switch to remote mode.
5. If calibration board is used, adjust remote set point source for 100% span value. The set point voltage at the calibration board for the 100% value should be 2.0 Vdc or 5.0 Vdc, depending on voltage applied from set point source. If remote set point source being used in 0 to 5 Vdc, cut jumper J1 on calibration board. Adjust P2 on calibration board until voltage across terminals 9 and 12 at rear of instrument is equal to that which was obtained in step 3 above.
6. If calibration board is not being used for 0 to 2 Vdc remote set point input, calibrate set point source as necessary to make it apply same voltage across terminals 9 and 12 at rear of instrument as was obtained for 100% setting in step 3 above. Note adjustment at remote set point source for future use as the 100% span value.

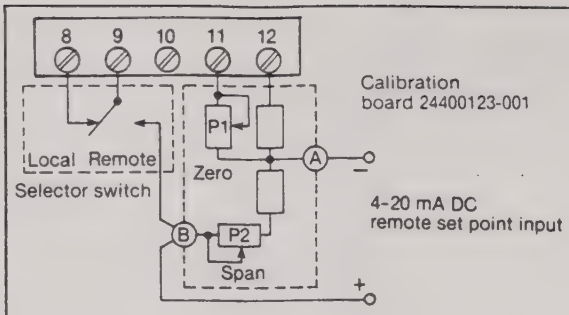


Figure 9

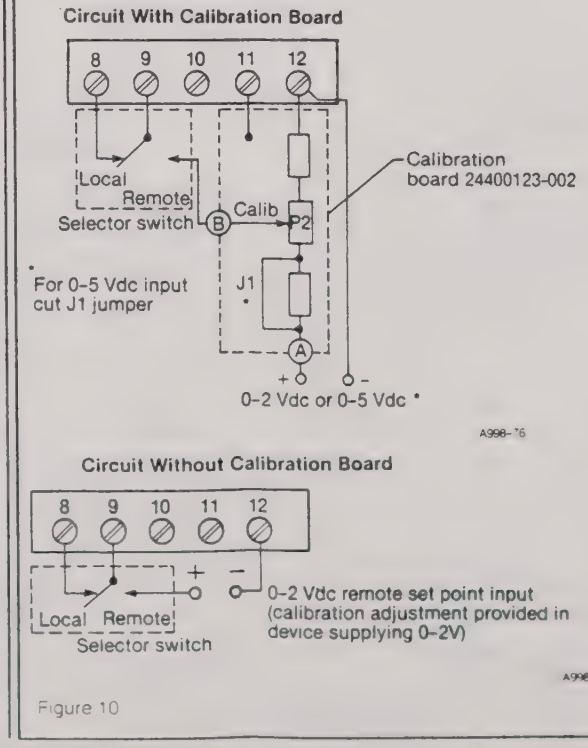


Figure 10

Calibration of Potentiometric Type Remote Set Point Circuit (Figure 11)

1. Remove plug-in chassis from case and clip out resistor R287 (R277 on heat-cool models) on instrument's lower printed wiring board. Reinstall chassis in case.
2. Turn on operating power to instrument.
3. Set local/remote selector switch to local mode.
4. Adjust local set point to 100% setting. Measure and record voltage across terminals 9 (+) and 12 (−) at rear of instrument.
5. Set local/remote selector switch to remote mode.
6. Adjust remote set point potentiometer to 100% setting. Then, adjust P1 on calibration board until voltage across terminals 9 and 12 at rear of instrument is equal to that obtained in step 4 above.

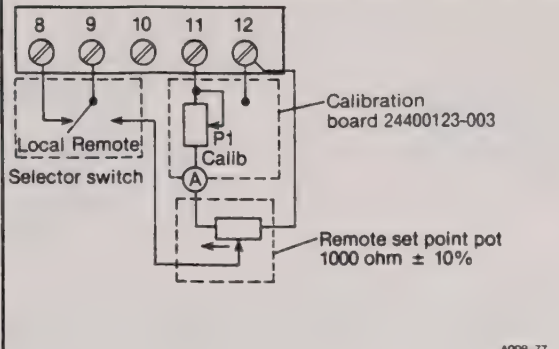


Figure 11

Dialapak - High and Low Limit Controllers

Models AV50, AV51, AV52, AV53, AV54, AV55, AV56, and AV57

Operating Data

Introduction

The Dialapak limit controllers, models AV50 through AV57, are miniaturized solid state instruments that provide high or low alarm and cutoff functions for a variety of industrial process systems. Table 1 lists the limit control, indication, and reset capabilities provided by the various models of these controllers.

Location of Adjustments

Figure 1 shows the various front- accessible adjustments and indicators.

Startup Procedure

Each Dialapak instrument is factory calibrated to specific range and actuation requirements before shipment. The startup steps are as follows.

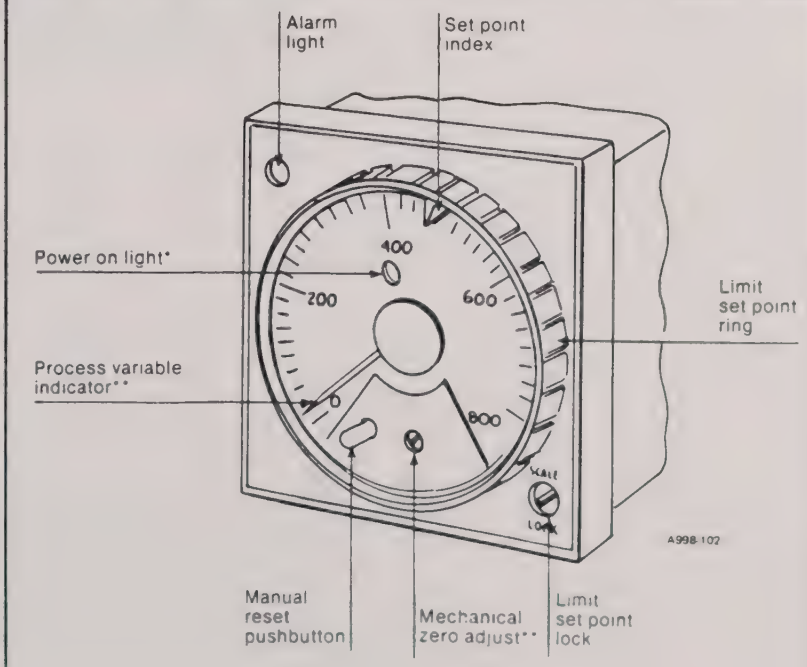
1. For the indicating models, make sure that the meter pointer is on zero. Gently tap the meter face for optimum reading. Use the mechanical zero adjustment on the face of the meter to align the pointer with the scale zero, if necessary.
2. Turn the limit set point ring until its index is aligned with the scale marking that corresponds with the desired limit set point for the process.
   NOTE: This instrument does not control the process set point
3. Turn the scale lock clockwise to lock the limit set point ring in place.
4. Apply the operating power to the instrument. For non-indicating models, check that the amber power on light turns on.
5. Push in the manual reset button on the instrument to reset the output circuitry
   NOTE: If applicable, use the optional remote reset switch for this function
6. For indicating models, check that the meter is indicating the value of the process variable
7. Check that the red alarm light turns on when the instrument output relay trips to activate the external circuitry. For low limit models, the output relay trips when the process variable falls below the limit set point; for high limit models it trips when the process variable exceeds the limit set point

TABLE 1 - Dialapak Limit Controllers

Model	Control		Indication		Reset	
	High Limit	Low Limit	PV Indicator	Non-Indicating	Man Only*	Man Plus Auto**
AV50	•		•		•	
AV51	•			•	•	
AV52		•	•		•	
AV53		•		•	•	
AV54	•		•			•
AV55	•			•		•
AV56		•	•			•
AV57		•		•		•

*Manual reset required after power interruption and when process variable is out of limits.

**Manual reset not required after power interruption except when process variable is out of limits.



*On non-indicating models only
**On indicating models only

Figure 1 - Front Assembly of Limit Instrument

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Dialapak Controllers
All Models

Service Data

General

Dialapak instruments are designed to provide trouble-free operation over a long period of time. The method of assembly minimizes the chance for instrument failure. No scheduled maintenance is required to keep an instrument in good operating condition. If it is suspected that an instrument is not operating properly, the process variable type indicator on an instrument can be used as an aid in isolating a malfunction to a particular area. If the instrument contains a deviation type indicator, or is a non-indicating type device, an appropriate external indicator connected to the process variable output (0 to 5 Vdc) can be used for this purpose. The following chart gives probable causes for certain meter indication symptoms.

Symptom	Probable Cause
Meter Inoperative	Defective ac power supply.
Meter at or near zero at all times (models without burnout)	Open input circuit. Open meter or circuit board connections to front assembly.
Meter Upscale (upscale burnout models)	Open sensor circuit. Open compensator (T/C models).

It is recommended that field repair of Dialapak instruments not be attempted beyond the replacement of the parts listed in the Parts List. Defective instruments should be returned to the factory for repair. Return defective instruments to:

Local Honeywell Branch Office, distributor, or

Honeywell
1885 Douglas Drive North
Minneapolis, Minnesota 55422

(In Canada — Honeywell Limited
155 Gordon Baker Road
Willowdale, Ontario M2H 3N7)

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Dialapak Controllers
All Models Except AV10

Parts List

General

The method of assembly used for Dialapak instruments makes field replacement of most components impractical. The replacement parts for Dialapak instruments are limited to those specified in Table 1. Figure 1 shows the chassis location of these components. Replacement parts can be obtained from

1. Local Honeywell Branch Office, distributor, or
2. Honeywell
   1885 Douglas Drive North
   Minneapolis, Minnesota 55422
   (In Canada — Honeywell Limited,
   155 Gordon Baker Road
   Willowdale, Ontario M2H 3H7)

TABLE 1 — Replacement Parts

Part No.	Item	Qty.	Use	Models				
				AV30	AV31	AV50 thru AV57	AV70 thru AV73	AV90 thru AV97
134378	Relay, electromechanical, SPDT, plug-in type	1	Primary output or limit relay[1]	•	•	•	•	
138297	Relay, solid state, SPST, plug-in type	1	Optional primary output relay[1]	•			•	
24001179-001	Relay, electromechanical, SPDT, solder type	1	Auxiliary alarm relay[2 3]	•	•		•	•
24001737-001	Relay, electromechanical, SPST, solder type	2	Dual deviation alarm relay	•	•		•	•
24001157-002	LED, green	1	Primary output light	•	•		•	
24001158-002	LED, red	1	Alarm or limit light	•	•	•	•	•

[1]Also used for heating output in heat-cool models.
[2]Also used for cooling output in heat-cool models.
[3]Not used for dual deviation alarm.

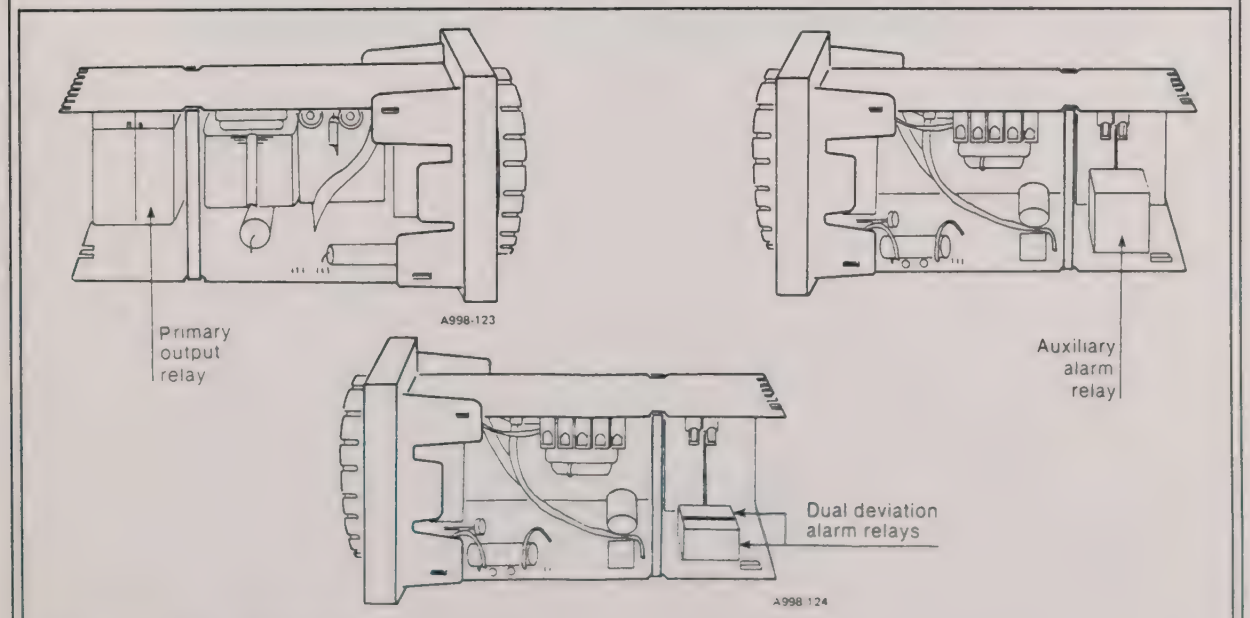

Figure 1—Location of components on chassis

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IMPORTANT NOTICE FOR 3 PHASE OVENS

WARNING

BLOWER MUST ROTATE IN THE PROPER DIRECTION TO INSURE EFFICIENCY.

INCORRECT BLOWER ROTATION RESULTS IN A SUBSTANTIAL REDUCTION OF AIR-FLOW.

CHECK FOR CORRECT BLOWER ROTATION WITH BLOWER MOTOR OPERATING. OPEN OVEN DOOR AND NOTE AIR-FLOW AT DISCHARGE POINTS ON RIGHT HAND SIDE OF OVEN INTERIOR. WHEN ROTATION IS CORRECT, RAPID AIR-FLOW CAN BE FELT AT THIS POINT.

IF BLOWER ROTATION IS INCORRECT, REVERSE ANY TWO POWER LINE CONNECTIONS, AND BLOWER ROTATION WILL BE REVERSED.

IF YOU ARE IN DOUBT, CHECK AIR-FLOW WITH POWER LINES CONNECTED BOTH WAYS TO DETERMINE WHICH PRODUCES GREATEST AIR-FLOW.

BLUE M
A UNIT OF GENERAL SIGNAL
BLUE ISLAND, ILLINOIS 60406

INSTRUCTION I 302-15
APRIL, 1982

IMPORTANT!

Refer to the wiring diagram and/or data plate supplied with the operating and maintenance instructions, for line current requirements prior to connecting to switch box or power source.

Good heating element design practice often prohibits effective balancing of all 3 phases.

On certain models, supplying multiple saturable reactors and heating elements to provide a balanced 3 phase load would be impractical and costly.

On other models, the use of power selector switches and auxiliary elements create unbalanced line currents.

BLUE M

A UNIT OF GENERAL SIGNAL

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MAINTENANCE AND OPERATING INSTRUCTIONS FOR DIGITAL TEMPERATURE INDICATOR/OTP

A Digital Temperature Indicator/Overtemperature Protection Device has been added to this Blue M Equipment. This instrument provides a constant accurate indication of chamber temperature, and protects chamber and work load from damage due to an overtemperature condition.

The entire OTP system consists of the temperature indicator/overtemperature protection device, an external time delay and a reset circuit. This design allows automatic restart of the unit if the overtemperature condition is of short duration. If temperature within the work chamber rises above the OTP set point, OTP will trip and unit will shut down. As unit cools below OTP set point, Max-Set circuitry will automatically restart the unit. This cycle will repeat a few times if the overtemperature condition is not rectified. After cause of condition is determined and corrected, press the OTP Reset Switch to manually restart the unit.

OTP Set Point Adjustment (Refer to Figure 1)

When the set point button is pressed, the display shows the OTP set point. To adjust the OTP set point, press the set point button and turn the adjustment screw located in the recess above the button. Normally, the OTP set point should be adjusted 10°C above the main control temperature.

Selection of Farenheit or Celsius Indication-Model 2-2

To change your Digital Temperature Indicator from C to F, or vice versa, follow the procedure below.

1. Turn off all electrical power to unit.

2. Gain access to control compartment. (See unit instructions for procedure.)

3. Locate rear of Digital Temperature Indicator in control compartment. Remove edge connectors by depressing plastic tabs (D, Fig. 2) and pulling connector straight back. With models C09B-5-1 and C09B-5-2, two edge connectors are used. Follow the same technique to remove the second connector. Take care to label the connector so that they are not transposed when the unit is reassembled.

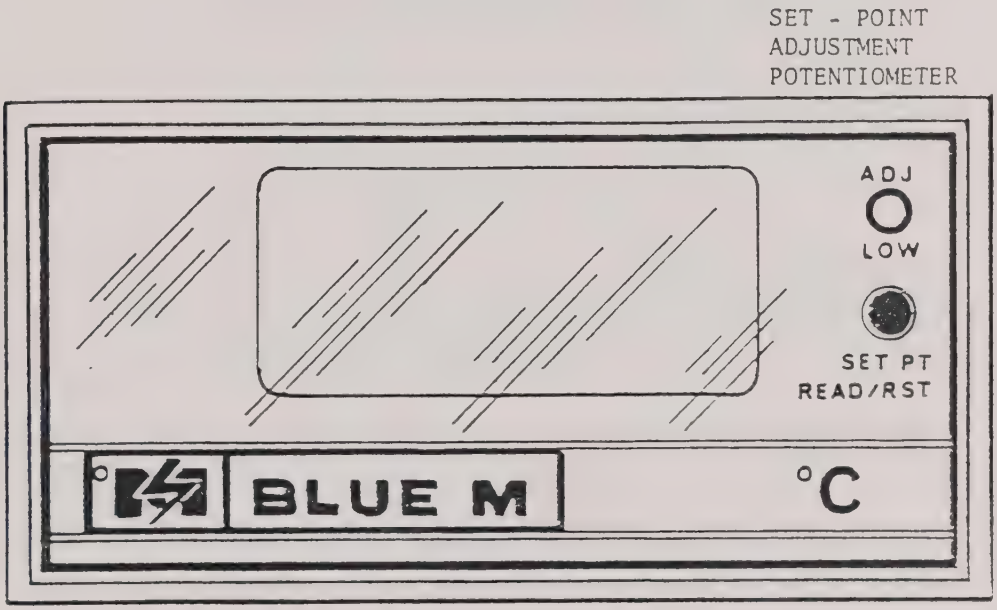

SET - POINT
ADJUSTMENT
POTENTIOMETER
ADJ
LOW
SET PT
READ/RST
BLUE M
°C

FIG. 3-B

4. Remove 2-#8 Phillips head screws, (A, Fig. 2) on back of Indicator. Gently pry off clamp rings. (B, Fig. 2) Slide side rails off of case. (c, Fig. 2)

5. Carefully remove Digital Temperature Indicator from control panel.

6. Place Indicator on a firm surface. Lift off top half of case. Locate °F-°C switch on vertical plug in card. (Refer to Fig. 3). Move switch to front of case for °F indication -- to rear of case for °C indication.

7. Reverse steps 1-6, above, to reassemble and install Indicator.

8. See lens designation and part nos. chart on following page to order lens with correct temperature marking.

Newer Indicator/OTP units include a push button switch to correct the OTP setpoint error encountered when changing temperature scales. This switch is located behind the lens on the left hand side of the display. Depress button when °C indication is selected -- release button when °F indication is desired.

RTD Sensor Replacement

1. Turn off all electrical power to unit.

2. Gain access to the control compartment. (See unit instruction for procedure.

3. Remove lower edge connector (E, Fig. 2) by depressing plastic tabs (F) and pulling off. If you have Indicator Part No. CO1F-0 or CO1F-7 only one edge connector is used. RTD sensor leads attach to pins 16 ("7") and 18 ("9") on the lower edge connector. Refer to Fig. 4.

4. Heat pins 16 and 18 with a soldering iron and remove the lead wires. Remove the old solder from each pin by suitable means as this accumulation of oxidized solder will impair the quality of the new joint.

5. Attach new RTD leads to pins 16 and 18 of lower edge connector and solder carefully. Observe proper polarity.

6. Push edge connector onto circuit board until plastic tabs snap and lock into place.

Lens Designations and Part Nos.

PART NO.	TEMPERATURE INDICATION	DESCRIPTION
C09B-5-1	°C	Indicator/OTP
C09B-5-2	°F	Indicator/OTP
C01F-6	°C	Indicator Only
C01F-7	°F	Indicator Only

NOTE

WHEN CHANGING TEMPERATURE INDICATION, ORDER LENS USED WITH INDICATOR SHOWN IN TABLE.

BLUE M
A UNIT OF GENERAL SIGNAL

Re-calibration of Digital Indicator After RTD Replacement

An ice bath or zero-point cell must be used to re-calibrate the indicator after the RTD sensor has been replaced. An ice-bath consists of a mixture of ice and water which is at 0°C (32°F). Water constitutes a reliable source for calibration under these circumstances.

Care should be taken to allow the sensor to stabilize before re-calibrating. When the sensor has stabilized, proceed as follows to zero the indicator.

1. Remove the lens on the front of the Digital Temperature Indicator by inserting a screwdriver under the notch at the bottom of the lens.

2. Locate the zero adjustment potentiometer behind the lens on the left side of the housing. (Refer to Fig. 3). Use the proper potentiometer for Farenheit or Celcuis indication.

3. Apply power to the meter and allow it to warm-up for 2 minutes.

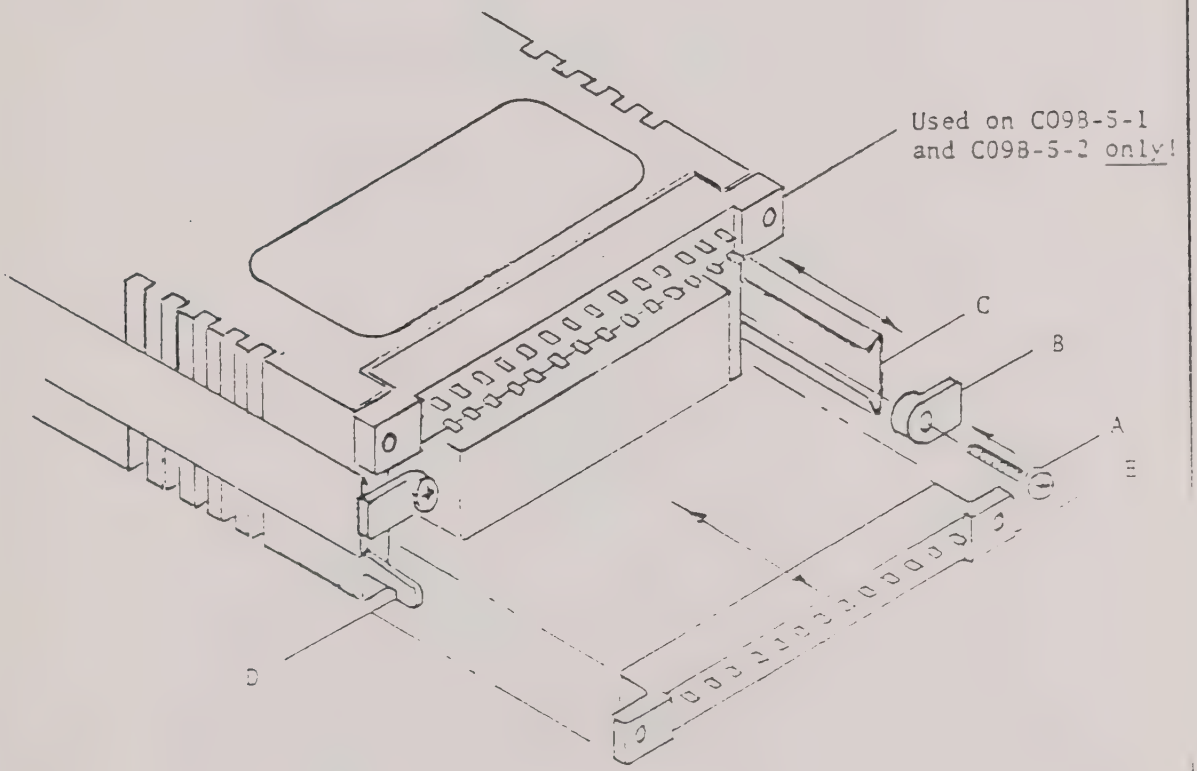
4. Stir the RTD in the ice-bath until a stable reading on the display is obtained.

5. Adjust the °F or °C potentiometer to obtain a display of 0°C or 32°F.

6. Snap lens back into case.

7. Position RTD sensor in unit, or isolate if the sensor

REAR VIEW OF DIGITAL TEMPERATURE INDICATOR



A - #8 Phillips head screws
B - Clamp rings
C - Side rail
D - Plastic tabs
E - Connector

FIG. TWO

Zero Adjustment Potentiometer Position and °F-°C Switch Location

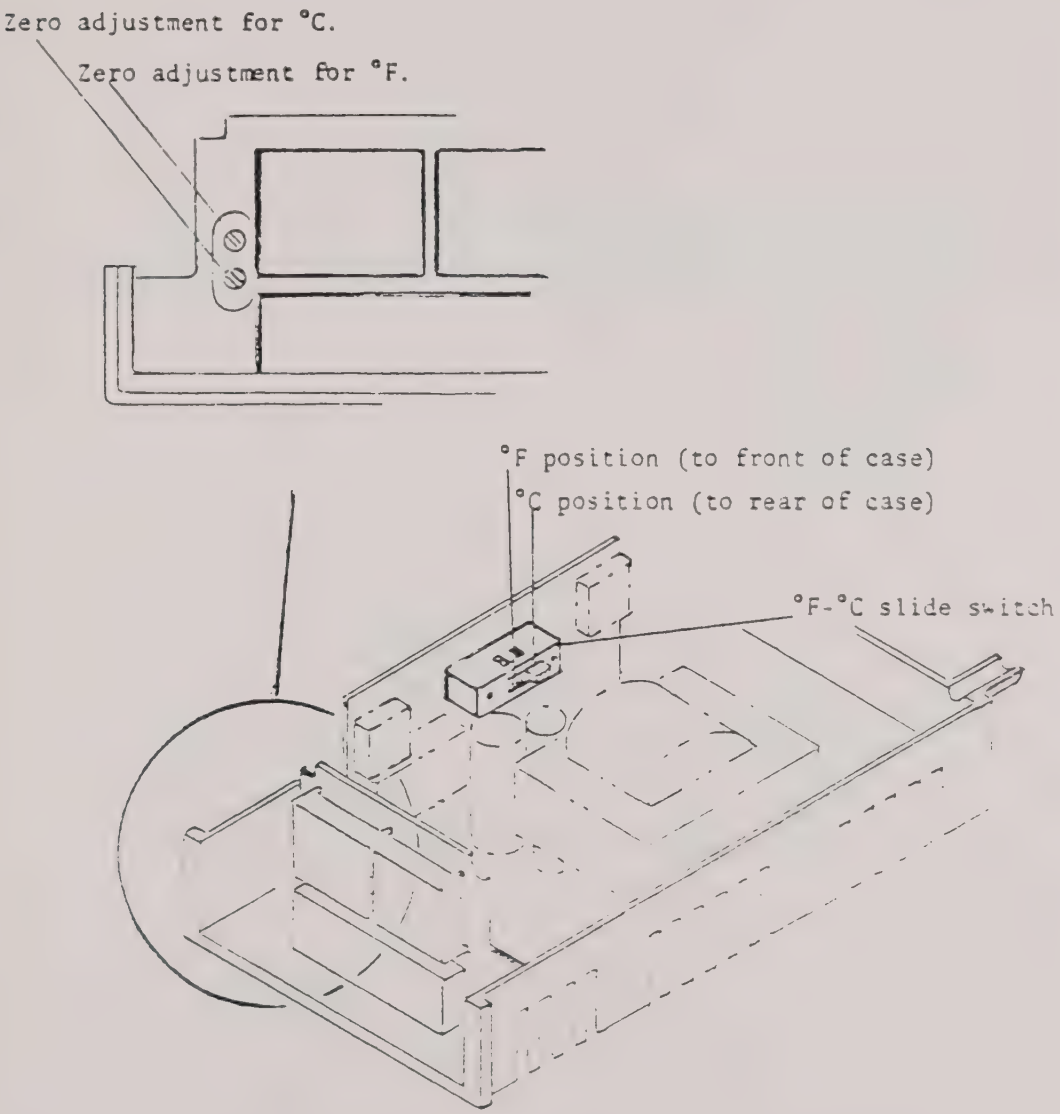
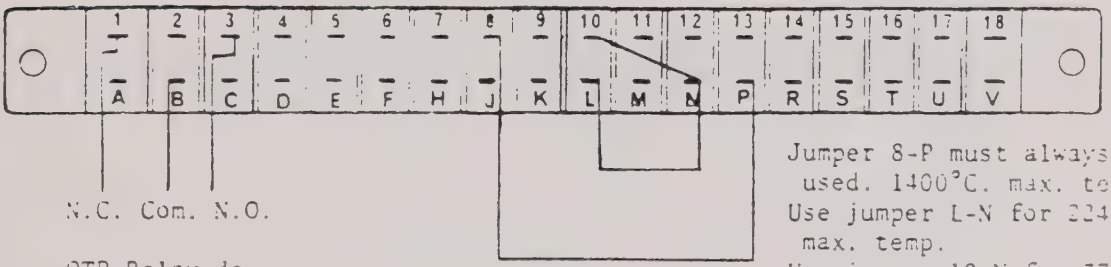


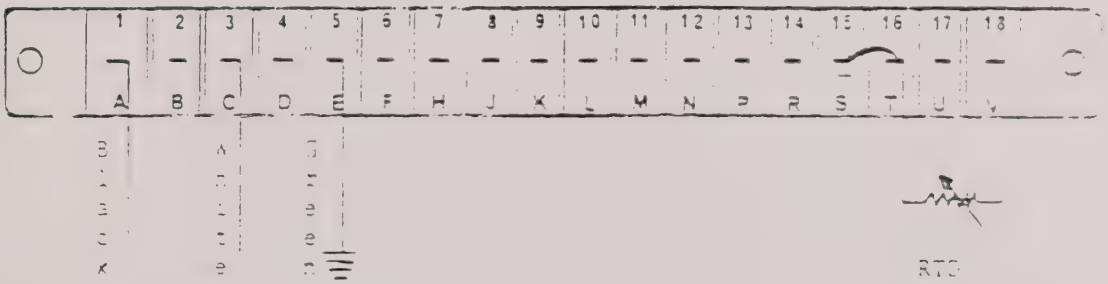
FIG. THREE

Circuit Board Edge Connector Wiring

J2 - Upper Edge Connector (C09B-5-1 and C09B-5-2 Only!)

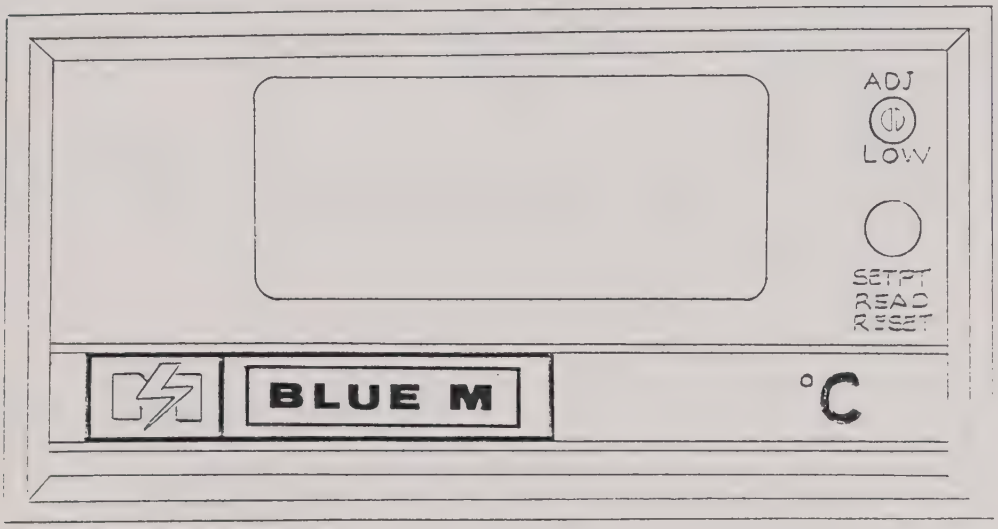

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
A B C D E F H J K L M N P R S T U V
N.C. Com. N.O.
OTP Relay de-energized above set point.
Jumper 8-P must always be used. 1400°C. max. temp.
Use jumper L-N for 224°C. max. temp.
Use jumper 10-N for 371°C. max. temp.

J1 - Lower Edge Connector



Power - 115VAC

FIG. FOUR


ADJ
LOW
SETPT
READ
RESET
BLUE M
°C

BLUE M

BLUE M Electric Company

BLUE ISLAND, ILLINOIS

VPL-1745

Page ___ of ___

MODEL NUMBER: [illegible]

VOLTAGE: All

MAX. TEMPERATURE: _____

MAX. WATTS: _____

INTERIOR DIMENSIONS: 24Wx24Dx48H

*PARTS NOT SHOWN

**OPTIONAL ACCESSORIES

Parts shipped F. O. B. Blue Island, Illinois. — When ordering parts, give Model No., Serial No., Voltage and Part No.

ITEM	DESCRIPTION	PART NUMBERS	REQ'D.
1	Blower Wheel-Standard	M10-A101	1
2	Blower Shaft Seal-Standard	M05-B236	1
*3	Blower Motor (Use With Stainless Steel Wheel) (1 HP)	E10B-5-12	1
*4	Blower Wheel-Stainless Steel	M10-B105	1
*5	Blower Shaft Extension-Stainless Steel	M06-H6-2	1
*6	Blower Shaft Seal (Use With Stainless Steel Shaft)	M05-B234	1
*7	Door Hinges	M01-A5	2
*8	Door Latch And Strike Assembly (50-3/4" BAR)	M02-G15	1
*9	Door Gasket	M05-A2-162"	1
10			
11	Shelves-Standard	M04-C302	As Req'd
12	Shelves-Stainless Steel	M04-C132	As Req'd
*13	Shelves (Use With Roll-in Rack Units Only)	M04-C309	As Req'd
*14	Shelves - Stainless Steel (Roll-in Rack Units Only)	M04-C126	As Req'd
15			
16			
17			
18			
19			
20	Screwdriver-Touchmaster Adjust	M29-D101	1
21	Hex Wrench-Touchmaster Adjust	M29-E101	1
22			
23			
24			
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50	Date: 9-1-72 By: SR Chk: DP App:		

BLUE M

BLUE M Electric Company

Corporate Headquarters BLUE ISLAND ILLINOIS 60406

MODEL NUMBER POM7-166A-F(Y)
VOLTAGE: 208,240V/3PH/60HZ (50HZ)
MAX. TEMPERATURE 316°C (600°F)
MAX. WATTS: 9, 12 KW
INTERIOR DIMENSIONS 24Wx24Dx48H

PWD- 286B-992-1
(PAGE 2)
THIS PARTS LIST TO BE USED WITH WIRING DIAGRAM
WD- 992 A

Parts shipped F O B Blue Island, Illinois — When ordering parts, give Model No., Serial No., Voltage and Part No.

*PARTS NOT SHOWN
**OPTIONAL ACCESSORIES

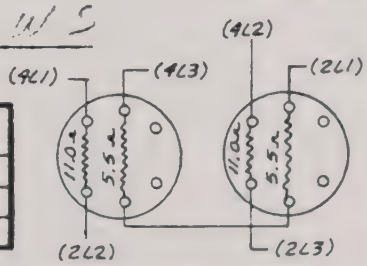
ITEM	DESCRIPTION	PART NUMBERS	REQ'D.
ABU	Alarm Buzzer-OTP	E01-1	1
1CAP	Capacitor-Filter	E03C-3-1	3
2CAP	Capacitor-Filter	Not Req'd.	
CON	Contactor-OTP	E02F-2-2	1
DISC	Fused Disconnect Switch (60A, 250V)	E16G-14	1
DS	Doorswitch	E16H-6	1
1-3FU	Fuse-Main(In Fused Disconnect Switch) (45 AMP)	E04C-45	3
4-6FU	Fuse-Blower Motor (7 AMP)	E04M-7	3
,8FU	Fuse-Voltmeter (0.5 AMP)	E04J-0.5	2
9,10FU	Fuse-Voltmeter (0.5 AMP)	E04J-0.5	2
11,12FU	Fuse-Voltmeter (0.5 AMP)	E04J-0.5	2
13 FU	Fuse-Control Transformer Secondary (2 AMP)	E04E-2	1
14-25 FU	Fuse-Heater	Not Req'd.	
1 HTR	Heating Element (11.0 OHMS)		
2 HTR	Heating Element (11.0 OHMS)	H45-0165-01	2
3 HTR	Heating Element (11.0 OHMS)(2-5.5 OHM In Series)		
1 INST	POM-70 Temperature Control	C03B-3-26	1
2 INST	Digital Temperature Indicator/ - °C(°F Use C01F-7)	C01F-6	1
3 INST	Touchmaster Control	C17H-01	1
3 INST	Touchmaster Control (4 Low Temp Pots)	C17H-03	1
4 INST	POM-70 Slave	C03B-6-5	1
5 INST	POM-70 Slave	C03B-6-5	1
6 INST	Overtemperature Control/°C (°F Use C08B-1-02)	C08B-1-01	1
7 INST	Purge Timer (50 HZ Use C12C-5)	C12C-3	1
1 LT	Pilot Light-OTP (Red)	E06B-9	1
2 LT	Pilot Light-Main(Red)	E06B-9	1

	DESCRIPTION	PART NUMBERS	REQ'D
S	Limit Switch-Drawer Interlock	E16H-9	1
TR	Motor-Blower (1 HP)	E10B-5-15	1
M	Motor Starter-Blower Motor	E11A-1	1
L	Overload Relay-Blower Motor	"See Item 1M"	
LH	Overload Heaters	E11D-N21	3
PL	Plug Connector (2 PIN)	E19A-13	1
PL	Plug Connector (6 PIN)	Part Of 3 INST	
S	Pressure Cutout-Airflow	E16L-1	1
TM	Thermistor-Temperature Sensor	C11D-4-1	1
SS	Rotary Selector Switch	E16D-6	1
TD	Resistance Bulb-Temperature Sensor	C11C-1-7	1
	Transformer-Control (250VA)	E17B-2-2	1
/C	Thermocouple-Type "J"	C11B-1-1	1
GS	Toggle Switch-Control Power (Rocker Action)	E16B-4	1
M	Voltmeter With Resistor	E09-11	1
2X	Choke - Filter	E03D-14	2
X	Choke - Filter	E03D-14	1

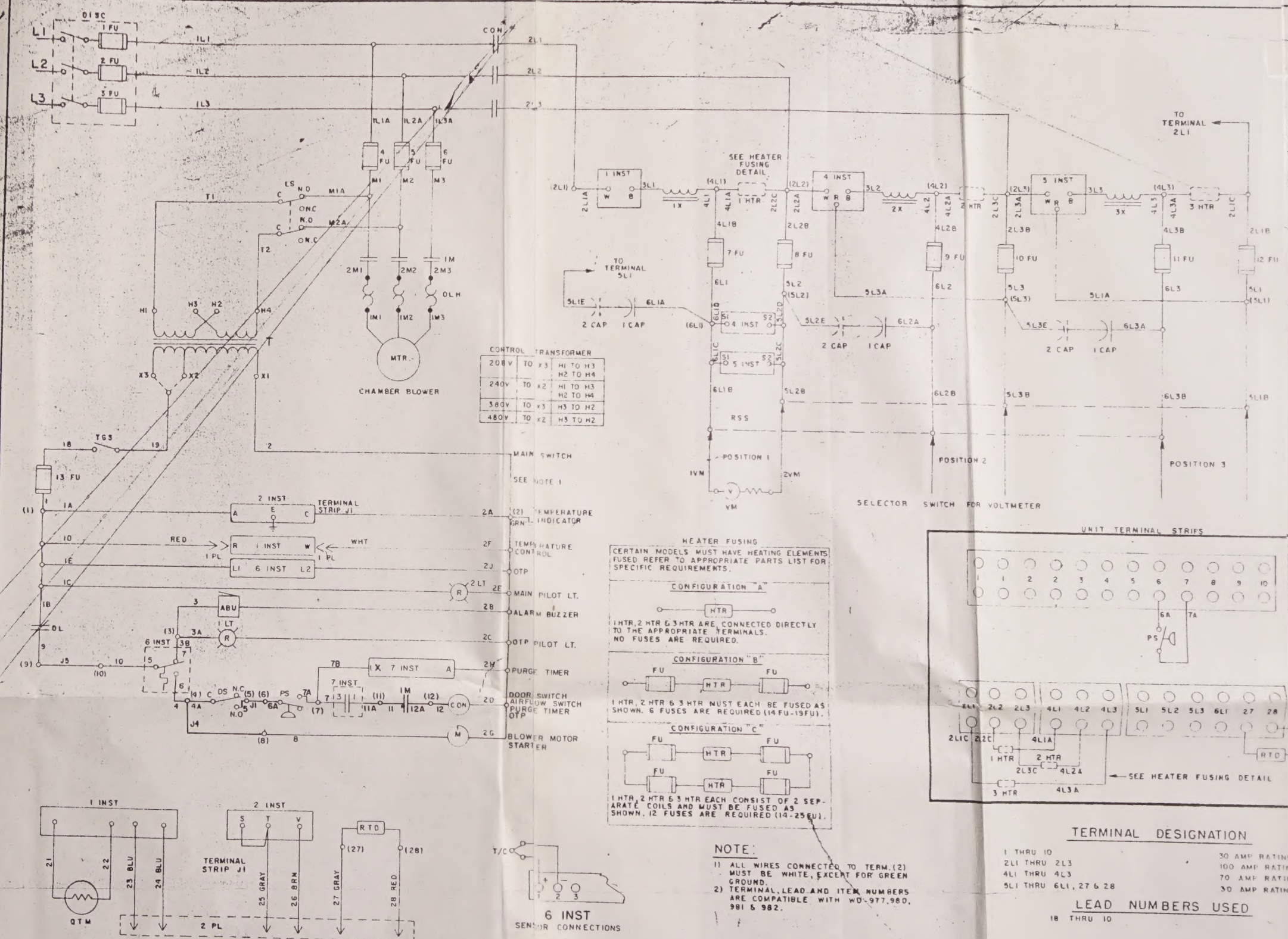
DATE: 3/10/83 BY: SW CHECKED: App.

Connect Per Configuration "A"

LINE NO.	VOLTAGE	AMPERES
L1	208/240V	32/36A
L2	208/240V	32/36A
L3	208/240V	32/36A



REVISION	REASON	DATE	BY



NOTE:

1) ALL WIRES CONNECTED TO TERM.(2) MUST BE WHITE, EXCEPT FOR GREEN GROUND.
2) TERMINAL, LEAD AND ITEM NUMBERS ARE COMPATIBLE WITH WD-977,980, 981 & 982.

TERMINAL DESIGNATION

1 THRU 10
2L1 THRU 2L3
4L1 THRU 4L3
5L1 THRU 6L1, 27 & 28

30 AMP RATING (12 PT)
100 AMP RATING (3 PT)
70 AMP RATING (3 PT)
30 AMP RATING (6 PT)

LEAD NUMBERS USED

18 THRU 10

—	G.B	4-83	J.Z		MOVED J4 FROM TERM. 6 TO 4
A	GB	3-83	J.Z		RENUMBERED TERMINALS
LET	BY	DATE	CHKD	APPD	REVISIONS

BLUE M — BLUE M Electric Company, BLUE ISLAND, ILLINOIS

PART NAME: WIRING DIAGRAM
USED ON: POM 7 CLASS A BATCH OVEN

SCALE	DATE	DRAWING NO	REV
	11-17-82	WD-992	A

DRAWN: G.B. CHKD: J.Z. APPD:

MP MASTER
MA33640